JPRS 81914

4 October 1982

USSR Report

TRANSPORTATION

No. 96

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AIR

BUGAYEV RECOUNTS CIVIL AVIATION'S DEVELOPMENT, PROSPECTS

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 4, 1982 pp 5-9

[Article by Boris Bugayev, USSR minister of civil aviation, chairman of the CEMA Standing Commission for Cooperation in the Field of Civil Aviation: "Results and Prospects for Cooperation in the Field of Civil Aviation"]

[Text] The deepening of mutual cooperation is confronting the fraternal countries with new tasks. One of them is further development of integration in the transportation sector, creation of a network of suitable international air connections, without which it is impossible to expand economic and cultural relations, including tourism.

In the postwar years the civil aviation of the CEMA member countries has taken a large step forward. Instead of the slow and small-capacity piston-engine planes, the Il-12, Il-14 and Li-2, the large-capacity turbojet and turboprop liners, the Tu-104, Li-18 and An-24, came into service, and then the Tu-134, Tu-154 and Il-62. Airports have been improved, old ones have been modernized and new ones built, making it possible to receive the ever newer types of aircraft. New ground-based radio navigation equipment has been introduced, ensuring regularity and flight safety.

The uninterrupted renewal of the equipment in civil aviation, the introduction of fast planes, have ensured a sharp rise in the pace of development of air traffic. Whereas in 1960 the air carriers of the CEMA member countries maintained regular flights on 105 international routes, in 1980 the number had already risen to nearly 300. The volume of traffic in that time increased more than 13-fold.

The organizational forms of cooperation have also been improving steadily. The working group created in 1959 (renamed section for air transportation in 1962) was reorganized in 1975 as the CEMA Standing Commission for Civil Aviation.*

In view of the need to create appropriate legal prerequisites for development of international air traffic, recommendations regulating the flight and

* In 1981 renamed the CEMA Standing Commission for Cooperation in the Field of Civil Aviation.

technical operation of aircraft, procedure for handling passengers, luggage, cargo, and so on, were drafted for the first time within the framework of CEMA.

In 1964 the first agreement was signed on cooperation of air carriers in the fields of operations and commercial and financial relations (the Berlin agreement). Mutually adjusted rate schedules and timetables were worked out on the basis of that agreement, and mutual assistance was extended in improving the activity of air carriers and in achieving the best economic results.

The use of aircraft has also been expanding rapidly in other sectors. Airplanes and helicopters are widely used in agriculture to protect plants against pests and diseases, to destroy weeds in crops, to apply manufactured fertilizers, and for defoliation and desiccation of plants. In order to improve responsiveness in solving the problems of interaction and to establish closer contacts among air carriers of the CEMA member countries, the Agreement on Affairs of Cooperation in the Field of Aircraft Use in the Economy was signed in 1969.

The Comprehensive Program ..., which was adopted in 1971, and the DTsPS [long-range target programs for cooperation] in the leading branches of physical production became the basic programmatic documents for interaction over the next 10 years. Comrade L. I. Brezhnev, speaking at the 26th CPSU Congress, said on this topic: "It is well known that the decisive front of competition with capitalism is in the economics sphere, the sphere of economic policy. At the last congress we, like the other fraternal parties, advanced as a priority task the further deepening of socialist integration on the basis of long-range target programs. Their purpose is to help in solving the most acute and vitally important problems of the economy.

"At the present time these programs are being embodied in specific deeds. The pace of integration is stepping up."

The measures envisaged in the Comprehensive Program ... and the DTsPS are very extensive and interconnected. They are specific in nature and essentially cover all the spheres of activity of civil aviation.

A most important peculiarity of the present stage of its development is the continuous qualitative improvement of aviation equipment, equipment for air traffic control, navigation and landing, and the mechanization and automation of production processes at airports.

Passenger service has now begun with the 350-seat Il-86, the first Soviet wide-body aircraft, on the Moscow--Berlin--Moscow route. It has four NK-86 turbofan engines with a thrust of 13 tons in the takeoff mode. Highly reliable units, assemblies and materials have been used in the plane's construction. The range at maximum load is 3,600 km, and speed 900-950 km/hr.

The Yak-42 aircraft was built for short main routes. It can carry 120 passengers over a distance of 1,800 km at a speed of 820 km/hr. Its three turbofan engines guarantee a high saving on fuel consumption. This is an advantage which the Yak-42 has over its predecessors.

Introduction of the airplanes of the new generation--the Il-86 and Yak-42--into service is an important stage in development of civil aviation. They ensure a further rise of flight productivity and economy and an improvement of the quality of passenger service.

A new passenger plan, the L-410, manufactured in Czechoslovakia, is also operating successfully on international air routes. It is designed to carry 15 persons over a distance up to 600 km at a speed of 375 km/hr. The plane has two turboprop engines each with a capacity of 750 hp, a retractable undercarriage and flight instruments that allow for it to be used in problematical weather conditions in the daytime or at night. In recent years aircraft designers and enterprises of the Czechoslovak aircraft industry have essentially modified it (the L-410 STOL), which makes it possible for the plane to be used at smaller airports.

The Il-76T airplane, with a cargo capacity of 40 tons, has been built and put into use in international traffic to carry large-size cargo. The flight instruments guarantee its operation in problematical weather conditions and an approach in the automatic mode in accordance with the first category of international standards. The Il-76T is now replacing the An-12.

The aircraft builders of fraternal Poland, jointly with Soviet engineers and designers, have built yet another new airplane, the M-15, whose jet engine helps in chemical dusting and spraying.

The constant growth in the volume of air traffic and the use of airplanes in the economy are increasing the frequency of airplane traffic within the zones of airports and on air routes. It is sufficient to say that in the Moscow air zone alone one plane takes off and lands every minute. The situation is almost the same in the vicinity of a number of other large airports of the CEMA member countries, especially in the summertime.

A great effort is accordingly being made within the framework of the CEMA Standing Commission for Cooperation in the Field of Civil Aviation to improve the air traffic service, especially to introduce computerized control systems.

An analysis of foreign experience and research done by specialists of the CEMA member countries have shown the advisability of comprehensive computerization of the processes of flight control in zones with the highest traffic density.

In the USSR, for example, AS UVD [computerized air traffic control systems] have been introduced in the Moscow air zone and also in the airports at Borispol, Pulkovo, Rostov-na-Donu, Mineralnyye Vody and Sochi.

The "Koren'" radars, which meet the codes of the USSR and the ICAO, are in series production. They have been installed in the Soviet Union, Hungary, Czechoslovakia and the GDR.

A system belonging to the new generation is now being developed in the USSR; it would have warning signals on conflict situations, and all the most important processes of air flight control would be computerized.

The APROS system has gone into operation in Czechoslovakia. Preparations are being made to furnish the "Avma-Ts" for primary radar and the "Koren'" for secondary.

By 1985 research will be completed and the ARAS computerized radar system will be put into service at the Prague and Bratislava Airports.

USSR specialists have developed the "Sigma" system on a technical assignment from Hungary; it has been in service since 1981.

A computerized traffic flight control system is also being introduced at the Warsaw Airport. Work is continuing to build the air traffic radar control center at the Gdansk air traffic station (aerouzel).

At the Schoenefeld Airport in Berlin, GDR, the "Gamma 1" system is used; it consists of the ANIS-250 equipment for primary processing of radar information (manufactured in the USSR) and the Odra-1305 computer (manufactured in Poland). GDR specialists are working on the problems of advanced flight planning. Plans call for conducting an experimental test of the results before 1985.

The General Agreement on Organization of MNETs UVD [International Scientific-Experimental Center for Air Traffic Control] was signed in June 1979 so that a set of operations might be carried out in the CEMA member countries concerning optimum use of air space and the testing of AS UVD equipment. A decision was made on joint use of the Soviet Scientific-Experimental Center for Computerization of Air Traffic Control in the interests of the CEMA member countries.

Research is being conducted in MNETs UVD in accordance with programs agreed on among the respective agencies (organizations) of the parties to the agreement on the basis of bilateral agreements (contracts) beginning in 1982.

In accordance with obligations under the general agreement, the USSR is now furnishing the experimental-scientific facility with up-to-date equipment for conducting research.

Yet another important direction in the work of the CEMA Standing Commission for Cooperation in the Field of Civil Aviation envisaged by the DTsPS is development of international airports. In 1979 a general agreement was concluded among the countries on this question. The goal was to increase their traffic capacity by fully mechanizing and automating production processes.

As is well known, a modern airport is an enterprise with a large and complicated operation. Dozens of services perform time-consuming operations in a definite technological sequence: care of runways, taxiways, aircraft parking areas and fuel and power facilities. Particular attention is being paid to mechanizing the processing of luggage and cargo.

The Summary Table of Equipment for Mechanization and Automation of the Processes of Attending Passengers, Servicing Aircraft, Processing Cargo and Maintaining Airports in Civil Aviation was worked out with the creative cooperation

of students, designers and engineers of the CEMA member countries. The drafts of treaties and multilateral international specialization and cooperation in manufacturing the various types of technological equipment have been prepared within the framework of the commission. They provide, for example, that Bulgaria will manufacture baggage trucks, Hungary information display panels, the GDR collapsible warehouses and booths complete with scales where passenger agents can check in passengers, and Czechoslovakia lighting equipment, and so on.

In accordance with the DTsPS, the General Agreement on Creating and Activating the Interlinked Complex of Computerized Seat Reservation and Ticket Sales Systems on International Air Routes was signed in 1979 and is already being carried out.

It was to that end that USSR Aeroflot introduced the "Avrora" system. It includes a data processing center (computer center in which all information on availability of seats on Aeroflot's international routes is concentrated). The center is in communication with Aeroflot's foreign agencies over leased channels of the SITA international aviation communications network. Representative offices abroad, which are equipped with a standard set of terminals, are plugged directly into the system in a few seconds. This makes it possible to submit an inquiry and obtain a response on space reservation for any trip.

The Interflueg (GDR) Air Line was the first air carrier to be connected to the "Avrora" system. Specialists of the two fraternal air lines did a great deal of joint work to hook up the terminal equipment in the GDR and train the personnel. Full-scale operation of the system for joint reservation of seats and sales of tickets on international air routes began on 1 September 1981. At the present time the question of connecting the air carriers of a number of other CEMA member countries into the system is under study.

The growing volume of traffic and expansion of the stock of airplane engines of the fraternal countries have confronted them with a number of new and complicated tasks. The Agreement on Multilateral International Specialization of Repair of Aircraft, Aircraft Engines and Units was signed in 1975 to perform one of them in accordance with the Comprehensive Program.... On the basis of the agreement the countries designated the specialized enterprises, defined repair requirements more precisely, and agreed on repair performance time for the period up to 1985.

The USSR is extending technical aid to the countries which are specializing in repairing the Soviet aviation equipment used in those countries, is training specialists and workers, is providing technical repair manuals, equipment and gear for repair plants.

The interested CEMA member countries have in turn decided to build a plant in the USSR to repair long-haul and medium-haul main-line airplanes in the civil aviation system. A general agreement on this topic was signed in 1981. The countries which are party to the general agreement are to deliver to the USSR equipment, materials and machines in accordance with their shares. The enterprise will go into operation in 1989.

The steady development and improvement of aviation equipment are making it indispensable to organize personnel training and retraining. The commission is paying constant attention to this question.

The civil aviation of the CEMA member countries possesses an extensive network of educational institutions which are training specialists in all occupations. The training of flight and technical personnel and passenger agents is especially important and crucial.

In accordance with the Comprehensive Program ..., the CEMA member countries made a decision and in 1974 signed a general agreement to create on a compensation basis a joint center for training flight personnel, technical personnel and passenger agents for civil aviation.

The center's principal tasks are to retrain specialists of the CEMA member countries and other foreign air carriers, to improve the qualifications of flight crews and to supervisory personnel in the enterprises of civil aviation in accordance with the requirements of scientific-technical progress and to instill in them the spirit of proletarian internationalism and the friendship of people.

An important direction in cooperation among the CEMA member countries in the field of civil aviation over the next 10 years, set forth in a DTsPS, is the organization of joint operation of individual international air routes. Aeroflot and Interflueg have been operating the Berlin--Simferopol and Berlin--Sochi routes jointly for a long time now. New joint air routes have now been opened with other CEMA member countries: from Simferopol and Sochi to Budapest and Prague, from Sochi to Bratislava, from Tbilisi to Varna, from Tyumen to Sofia.

The time has obviously come to examine the possibility of the CEMA member countries jointly operating certain air routes to third countries as well.

In accordance with a decision of the 26th CPSU Congress and the congresses of the other fraternal parties for the next 5-year period provision has been made to further step up the rates of scientific-technical progress in civil aviation and to make optimum use of resources.

In Aeroflot, for example, thanks to research aimed at justifying a reduction of cruising speed on flights of the Il-62, Tu-154 and Tu-134 aircraft, at maximum reduction of auxiliary, training and nonproductive flying time, and also at reduction of the operating time of engines on the ground, considerable success has been achieved in reducing fuel consumption. No small saving was also achieved by straightening out air routes and by using the most advantageous flight conditions. Hundreds of thousands of tons of fuel have been saved by improving traffic and approach patterns, by reducing the time the aircraft is in the air waiting to land and a number of other measures. This important and indispensable work will continue in the scientific-technical councils of the commission. Then the experience and achievements of each country will become the property of the entire socialist commonwealth.

Over the next 10 years plans within the commission call for continuing the work to put into production and introduce on-board and ground radio systems to computerize air traffic control, navigation and landing. These measures will improve flight safety and regularity, and airports will be furnished up-to-date equipment to mechanize and automate the principal production processes.

As experience has shown, solving the economic and scientific-technical problems advanced by the congresses of the communist and worker parties of the CEMA member countries requires using both the internal resources of the countries and also the possibilities for mutual cooperation. As noted at the 26th CPSU Congress, it is not possible to imagine the confident development of any socialist country or its successful solution of such problems as introducing the most recent advances of science and technology without relations with the other fraternal countries.

In order to obtain accomplishment of the tasks it faces in the present stage of socialist and communist construction, the CEMA Standing Commission for Cooperation in the Field of Civil Aviation is constantly improving the style and methods of its activity, is obtaining a large practical return from the efforts made to make mutual relations more effective, as envisaged by the 26th CPSU Congress and the congresses of the fraternal parties of the other CEMA member countries.

PHOTO CAPTIONS

1. p 6, top — The Il-86 at the Schoenefeld Airport in Berlin.

2. p 6, bottom — The first Cuban crew of the Il-62M, trained in the USSR.

3. p 8 — Helicopters of the Balkan Air Line used in construction of the high-voltage electric power transmission line between Zlatograd and Momchilgrad.

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CSO: 1829/268

DEPUTY MINISTER REPORTS ON MOTOR VEHICLE PRODUCTION

Moscow ZA RULEM in Russian No 5, May 82 pp 2-3

[Article by A. Borzunov, USSR deputy minister of automotive industry: "Consuming Less, Producing More"]

[Text] Motor vehicle building is one of the principal branches of our machinebuilding industry. The final result of its work is represented by an annual output of more than 2 million trucks and automobiles, buses and specialized machines replenishing our motor transport pool, whose responsibility it is to meet the transportation needs of the economy and the public and to serve the needs of the country's defense.

The role and place of motor vehicle building in the present stage are determined by the tasks set in the 11th Five-Year Plan for further development of the branches of the production infrastructure and above all the branches of transportation, which is among the key sectors of our economy.

Present-day motor vehicles are in and of themselves rather complicated machines, and their level of production, just like their technical refinement, are determined by the coordinated efforts of many branches of industry. There are long chains of connections leading to motor vehicle building from metallurgists and petroleum refiners, power engineers and builders. That is why the success of the motor vehicle industry depends to no small degree on the work of numerous enterprises--in ferrous and nonferrous metallurgy, in machinebuilding, in the petrochemical industry and elsewhere.

How has the production of motor vehicles been developing in the first year of the 11th Five-Year Plan? A quantitative answer to that question is given by a summary of the USSR Central Statistical Administration: 2,197,000 vehicles, including 1,324,000 automobiles, 786,600 trucks and specialized machines, and 86,900 buses. A comparison of these figures with the results for 1980 shows that the output of buses has grown 2 percent, the output of trucks has remained at the previous level, and the output of automobiles has dropped 0.2 percent. A certain drop in the rate of their production has resulted from the need to "move up logistic support." The activation of additional capacities for the production of spare parts and workpieces, the organization of repairs of motor vehicles and their assemblies by industrial methods, and the reinforcement and development of the service network--these are the principal

matters which require attention, organizational measures, human and material resources in just as great a degree as the actual process of making motor vehicles. But these resources, if we objectively evaluate the scale of the tasks which have been set and the time for performing them, are limited. It is with this in mind that we have to judge the results of performance of motor vehicle building in 1981.

In 1981 automobiles continued to be predominant (61 percent) in the total volume of production. The largest number of them were manufactured by VAZ [Volga Association for Production of Automobiles]--719,786. It was followed by AZLK [Moscow Motor Vehicle Plant imeni Leninskiy Komsomol] with 179,342 cars, ZAZ [Zaporozhye Motor Vehicle Plant] with 161,739 (including 11,539 LuAZ [not further identified]) and GAZ [Gorkiy Motor Vehicle Plant] with 73,861. The production associations AvtoVAZ and AvtoZAZ have overfulfilled planning assignments they were given for the first year of the new 5-year plan, and for successful fulfillment of other standard indicators, just like the association ZIL [Moscow Motor Vehicle Plant imeni I. A. Likhachev], KamAZ [Kama Motor Vehicle Plant], AvtoKrAZ [Kremenchug Motor Vehicle Plant] and UralAZ [Uralsk Motor Vehicle Plant], which manufactured trucks, were awarded Red Banners of the CPSU Central Committee, USSR Council of Ministers, AUCCTU and the Komsomol Central Committee.

This high praise for the work of the leading production collectives takes into account all aspects of their activity: assimilation of capital investments, activation of new projects, conservation of physical and energy resources, and other indicators. One's attention is first called to the scale of development of the branch: over the past year its enterprises have assimilated 1,679.5 million rubles of capital investments, of which 633.2 million were spent for construction and installation work. To be specific, we have activated new projects with a production of 42,900 trucks and buses, 26,400 trailers and semitrailers, as well as for producing 57.8 million rubles worth of spare parts. Among them are shops and buildings for the manufacture of trucks, diesel engines, spare parts, castings and forgings at KamAZ; quarry dump trucks, wheel rims and spare parts at BelAZ [Belorussian Motor Vehicle Plant]; iron castings, spare parts and modernized equipment at VAZ; trucks and spare parts warehouses at UralAZ.

Among the most urgent and vitally important tasks set by the 26th CPSU Congress for our national economy in the eighties is the further rise in economic efficiency. This means that in every branch the volume of production must increase faster than the costs of manufacturing the product. One of the ways of reducing these costs is the careful use of resources. Thrifty consumption of resources in the motor vehicle industry is today being paid paramount importance. In 1981 the assignment was fulfilled to reduce consumption of steel pipe and rolled products of nonferrous metals and also to save 1.7 percent on heat. On the whole the effort being made by collectives of enterprises in the branch should be described as an endeavor to consume less in producing more.

But in and of themselves the extremely necessary and important saving of metal and reduction of vehicle weight yield the greatest benefit when they are accompanied by a rise in the equivalent strength (ravnoprochnost') of the

crucial assemblies and parts and by an increase in the service life and reliability of the vehicle as a whole. This aspect of economy can be judged by looking to the increase achieved in the life of vehicles before the first general overhaul. By the beginning of 1982 this index had been increased on the average as follows: up to 500,000 km for urban and interurban buses, up to 250,000-300,000 for trucks, up to 125,000-150,000 km for automobiles (up to 300,000-350,000 for GAZ-24 taxis).

The efficiency of utilization of the motor vehicle pool depends to no small degree on the supply of spare parts. Their number and assortment have up to now been a painful issue in solving this serious problem.

In 1981 the enterprises in the branch manufactured spare parts for automobiles alone (market stock) in the amount of 575.75 million rubles, exceeding the planning target by 8.4 percent. In value terms their total volume is distributed in this way (in proportion to the number of vehicles manufactured): 47 percent at VAZ, 10 percent at AZLK, and 9 percent at ZAZ, while other plants account for all the rest. The highest growth rate was achieved by ZAZ--21.6 percent. But manufacturing spare parts is only one aspect of the job of meeting the demand for them. No small role is also played by such factors as their distribution and the system of keeping inventories, as well as the existence of up-to-date warehouses, organization of the rebuilding of worn-out parts, and a number of others.

In the second year of the 11th Five-Year Plan motor vehicle builders are striving to harden the positions they have taken and to raise production efficiency still more. The assignments of the 5-year plan commit them to this. For instance, in 1985 the total volume of output at enterprises of the Ministry of Automotive Industry is to increase by 27 percent and labor productivity 24.3 percent. Plans call for reducing production cost by 3 percent and consumption of rolled metal products 18 percent. Relative to the number of vehicles which are to be manufactured in the last year of the 11th Five-Year Plan, these assignments are expressed in the following figures. In 1985 plans call for manufacturing 2.23 million motor vehicles, or 1.4 percent more than the 1980 level. The reason for such moderate growth has already been stated. But it should be borne in mind that whereas the output of automobiles is remaining close to the 1980 level, the production of trucks will increase 6.1 percent and that of buses 3.2 percent. We should add to this that over the 5-year period our motor vehicle plants will be renewing their model line to a considerable extent and indeed fundamentally. The Volga and Zaporozhye plants are to put new front-wheel-drive vehicles into production, the Kutais workers are undertaking production of an altogether new design--an agricultural dump truck. New models will also be put into production at the country's other enterprises. Improvement of the product mix and renewal and modernization of most of the models require substantial material outlays, which have in fact been duly taken into account in compiling the 5-year plan.

One of the most important tasks facing motor vehicle building in the 11th Five-Year Plan continues to be dieselization of the stock of vehicles. To that end there are plans for expanded production of diesel trucks at ZIL and commencement of their production at GAZ. By the end of the 5-year period the

total output of trucks and buses with diesel engines is to increase 69 percent. This growth will above all be accounted for by KamAZ, ZIL, UralAZ, KAZ [Kutais Motor Vehicle Plant], and also the bus plants LiAZ [Likino Bus Plant] and LAZ [Lvov Bus Plant]. The Likino plant is to put into production the new model LiAZ-5256, the prototype of which has already gone through experimental operation in Moscow at the beginning of 1982. The Lvov plant will be develop- production of the model LAZ-4202 (with a KamAZ diesel) and by 1985 will bring that production up to 4,200 units.

Other equally important lines of development are expansion of the production of specialized trucks, including trucks for agriculture. They include the KamAZ-43105 self-dumping truck train with three-side unloading of the body and "full-drive" (polnoprivodnyy) three-axle tractor; the KazAZ-55102 dump truck; and also the "full-drive" Ural-5557 dump truck and the KAZ-4540 dump truck with the GKB-8335 trailer.

In order to meet the needs of the mining industry the Belorussian Motor Vehicle Plant is to organize production during the 11th Five-Year Plan of new base models of quarry dump trucks with capacities of 110, 120 and 180 tons. Simultaneously with the transition to the new trucks, the volume of production is to be increased nearly 34 percent by 1985.

The Minsk Motor Vehicle Plant will begin in the 1981-1985 period to manufacture increasing numbers of truck tractors capable of towing semitrailers with load capacities of 30 and 27 tons.

Organization of the production of new models always becomes the property of extensive groups of drivers, shadowing in their minds other important lines of the branch's work. Something should also be said about them. In the 11th Five-Year Plan the network of automotive centers for servicing KamAZ vehicles is to be expanded and the plant and equipment of automotive centers strengthened for warranty period repairs, technical servicing and supply of spare parts for the BelAZ dump trucks. The productive capacity is also to be increased for technical servicing of Zhigulis, Moskviches and Zaporozhetses and the demand of vehicle owners for spare parts is to be satisfied more fully.

Rebuilding parts and assemblies on an industrial basis is becoming a task of great importance to the national economy along with increasing the output of spare parts. ZIL, KamAZ and YaMZ [Yaroslavl Motor Vehicle Plant] have already worked out such a technology and have undertaken organization of experimental repair work for demonstration purposes. The same thing is also being done at VAZ.

The particular lines of effort of enterprises in the automotive industry enumerated here make it possible to imagine the lines of development of the branch in coming years and to correctly understand and evaluate their importance to the national economy. The second year of the 11th Five-Year Plan has taken a good start. Responding with deeds to the decree of the CPSU Central Committee entitled "On the 60th Anniversary of Formation of the Union of Soviet Socialist Republics," the motor vehicle builders of Russia and the Ukraine, of Belorussia and Georgia, of Armenia and Kirghizia and the other

republics are striving to do more and better, to make their contribution to a further strengthening of the economic and defensive might of our multinational socialist homeland.

7045
CSO: 1829/275

SPECIFICATIONS FOR THREE EIGHT-WHEELED MAZ TRUCKS GIVEN

Moscow ZA RULEM in Russian No 6, Jun 82 p 10

[Article by V. Ivanovskiy]

[Text] For a number of years our industry has been manufacturing the MAZ [Minsk Motor Vehicle Plant]-535 and MAZ-537 trucks with increased roadability for delivery of heavy pieces of freight on roads of various categories, including dirt roads. These trucks are essentially distinguished from the widespread truck models with increased roadability in their design. They are more complicated in their arrangements, and it takes specialized training to operate and service them. The trucks of the MAZ-535 line consist of the 535A truck for full trailer with metal bed and canvas cover and the 535V truck tractor for pulling semitrailers. Another line includes the MAZ-537 truck tractor as the base model and also the 537A tractor for full trailer with metal bed and the truck tractor modifications MAZ-537G, MAZ-537D and MAZ-537Ye. Both lines have features of configuration and design in common: the power plant location between the cab and the bed, the hydraulic torque converter and planetary transmission box, the constant drive to all eight wheels, the nonspinning (blokiruyemyy) interaxle and interwheel differentials.

In all modifications the MAZ-535 and MAZ-537 have the 12-cylinder D12A diesel engine with a displacement of 38,880 cubic centimeters. It originated directly from the V2 tank engine from the period of the Great Homeland War. Modifications of this diesel engine have been used in the MAZ-525, MAZ-530 and BelAZ-540 quarry dump trucks. Peculiarities of its design--the aluminum crankcase, the nitrogen-hardened crankshaft, the four valves per cylinder, the two camshafts located in the head, and the lubrication system with "dry" crankcase--class it with racing car engines and aircraft engines. The picture is filled out by the prestarting heater, two-stage air filtration and two independent starting systems--the electric starter and compressed air.

The hydromechanical transmission includes the hydraulic torque converter, which smoothly changes the torque depending on road conditions without the driver's intervention. To be sure, the range of its change is not very broad, which is why the transmission includes a three-stage planetary gear box and two-gear transfer case. Thus the truck has six transmissions. In addition, when the second or third stages are being used in the transmission, there is a special device for blocking the torque converter. In this case the assembly

operates as a fluid coupling, its internal losses are reduced, and speed increases. If there is a grade the truck cannot make or any obstacle, the driver can press a button on the dashboard and unblock the hydraulic torque converter, which will immediately increase the torque it transmits to the necessary magnitude.

In the interests of increasing roadability the interwheel differentials between the first and second pairs of wheels are made in the form of mechanisms with high friction, while the interwheel differentials between the third and fourth pairs are self-blocking. Drive cannot be disconnected from any of the wheels.

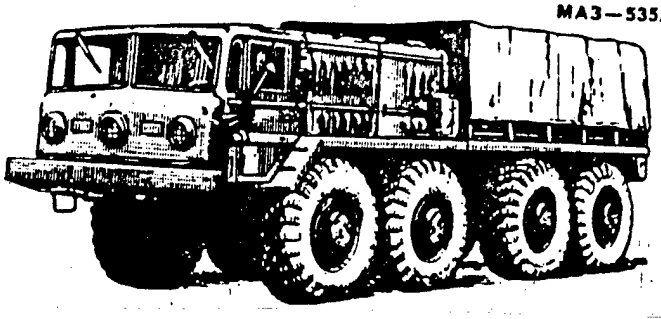
Increased roadability is provided by 18.00-24-inch tires (diameter about 1.7 meters), the large ground clearance, and also the winch for self-winching. The MAZ-535A has a centralized system for regulation of air pressure in the tires (from 2.0 to 0.7 kg per square centimeter), which also improves roadability.

That same MAZ-535A has independent torsion-bar suspension of all wheels, while other trucks have it only for the two front pairs of wheels. The rear two pairs of the MAZ-535B, MAZ-537A and MAZ-537G and other modifications have fully articulated suspension without springs.

Driving the eight-wheeled MAZ's is made easier by power steering, air-hydraulic power brakes, remote drive for gear shifting, and button actuation of the blocking of the torque converters. The four-seat cab is equipped with two heaters: one connected to the engine's cooling system and the other independent. The windshield wipers have highly efficient pneumatic drive, as does one of the horns.

Parameters	Model and Modification		
	MAZ-535A	MAZ-537	MAZ-537A
Load capacity, tons	7.00	50.0	15.0
Loaded weight, tons	18.97	21.6	22.5
Weight of the towed trailer, tons	15.00	65.0	75.0
Length, mm	8,780	8,960	9,130
Width, mm	2,805	2,885	2,885
Height, mm	2,915	3,100	2,880
Wheel base between front and rear axles, mm	5,750	6,050	6,050
Track width, mm	2,150	2,200	2,200
Ground clearance, mm	475	500	500
Maximum climbing grade, degrees	30	15	23
Fording capability, meters	1.30	1.0	1.0
Speed, km/hr	60	55	60
Rated fuel consumption, 1/100 km	75	125	125
Fuel tank capacity, 1	700	840	840
Engine capacity: hp	375	525	525
kw	276	386	386
Number of rpm	1,650	2,100	2,100

Note to table: The weight of the towed trailer is given for roads with a paved surface. The full weight of the semitrailer is indicated for the truck tractor.



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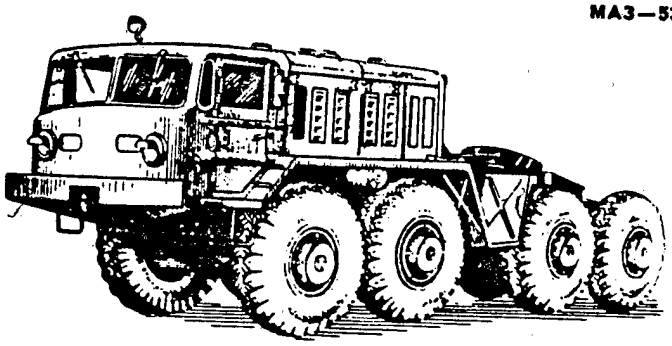

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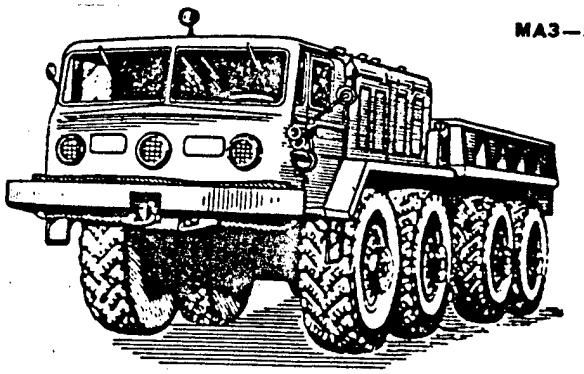

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7045
CSO: 1829/275

MOTOR VEHICLE

NEW GAZ-4301 AGRICULTURAL TRUCK

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Aug 82 p 2

[Article by TASS correspondent: "A New Truck-Train Rig"]

[Text] Completing the series of GAZ-4301 trucks right on schedule, the workers of GAZ [Gorkiy Auto Plant] have fulfilled an important part of their socialist obligations in honor of the 60th anniversary of the founding of the USSR.

Extensive tests have confirmed that the characteristics of the new truck fully meet the specifications, which were very difficult: create for agricultural use a machine of cargo capacity 4.5 metric tons, capable of operating as part of an auto-train on poor roads. For the first time in the half-century history of the plant the truck engine was to be an air-cooled diesel.

The Communist Party members headed the work on the development of the new model from the very beginning. A resolution of the plant Party Committee recommended the formation of initiative groups in many of the plant departments and support groups. They determined the extent and direction of the rearrangement of the production facilities.

Today the primary task of the Gorkiy plant team is to increase plant capacity without increasing the number of workers. The basic reserve lies in extensive introduction of high-productivity equipment. Plans are to install more than 460 automated production lines in the new facility. They must be constructed on a very tight schedule. GAZ will be assisted in fulfilling this task by powerful colleagues, primarily VAZ [Voronezh Auto Plant] and KamAZ [Kama River Auto Plant]. But the main load will fall on the shoulders of the Gorkiy plant workers.

The first to get involved in the preparations for production of the new truck were the toolmakers, who initiated a competition with the slogan: "Let's Deliver High-Quality New Trucks on Schedule."

The concerns of the auto plant workers found a response among many working groups of the city. Thus, initially the Promstroyproekt [Industrial Construction Planning] Institute was assigned the job of designing only a few

of the facilities. However the Institute communists, taking into consideration their experience in successful interaction with the auto plant workers and the constructor who will erect the facilities, undertook to supply the documentation for the entire general construction part of the project.

GAZ is the primary supplier of transport vehicles for agriculture. GAZ-53A trucks and GAZ-53B dump trucks constitute today more than 70 percent of the truck fleet of the collective and state farms. The new machine is far superior to the preceding models. The cargo capacity of the truck-train is 8.5 metric tons--more than twice that of its predecessor. The truck can handle bad roads, which is particularly important in the rainy season. The 125-horsepower air-cooled diesel engine also gives it definite advantages. In addition, use of the GAZ-4301 truck-trains will make it possible each year to free tens of thousands of drivers and save hundreds of thousands of metric tons of fuel.

The equipment operators know how difficult it is to empty a combine hopper into the body of a truck traveling alongside the combine without stopping the combine; the truck minimum speed is too fast for the Niva or Kolos combines. The new GAZ truck is better adapted for operation together with the harvesting vehicles: the gearbox design makes it possible for the truck to maintain a steady speed of 2 to 3 kilometers an hour.

Experimental models of the new truck have traveled a million kilometers over the roads of the nation. They have been tested by the equipment operators of the Niva and Tolmachevskiy State Farms in the Gorkiy area. These operators (who are the most self-interested testers of new machinery) agreed: the faster these trucks are put into operation, the better.

9576
CSO: 1829/298

VAZ AGRICULTURAL TRUCKS

Moscow EKONOMICHESKAYA GAZETA in Russian No 31 Jul 82 p 8

[Article by N Gerasimov, our correspondent in Miass: "Uralavtostroy Behind Schedule"]

[Text] The Ural-4320 trucks are at the present time rolling off the UAZ [Ural Auto Plant] final assembly line in Miass. Equipped with a diesel engine, this truck has good all-terrain characteristics, large cargo capacity and high speed. This machine can be found at various construction sites (including the routes of the major gas pipelines and electric power transmission lines) and hauling cargo in regions with inadequately developed highway networks.

In accordance with the Food Program adopted by the May (1982) CPSU Central Committee Plenum, the production truck design is being used as the basis for organizing the production of a special truck for agricultural use. It has been assigned the designation Ural-5557. The design of the machine was developed with account for the specifications of Minsel'khoz [Ministry of Agriculture] USSR and Goskomsel'khoztekhnika [State Committee for Agricultural Equipment], and also the results of operation of test models in the Zhitomir, Kirov, Moscow, Orenburg and Chelyabinsk Oblasts, that is, in various different agricultural zones.

A 210-horsepower engine is installed in the new truck. The cargo capacity is seven-eight metric tons. When using a trailer the Ural-5557 truck is capable of transporting twice as much cargo. The wide-profile tires with controllable inflation pressure ensure good all-terrain characteristics. The speed ranges from 3 to 70 Kilometers an hour, which makes it possible to operate along with various agricultural vehicles. Agricultural cargos of various volume and specific weight can be transported in the self-dumping body with extended sides, equipped with a canvas cover. Unloading can be accomplished from both sides. The extension sides, which are opened by an automatically controlled power drive, make it possible to transport green forage crops. If a special interchangeable body is installed, the truck can deliver mineral fertilizers and apply them to the soil.

The Food Program includes the following task for the UAZ workers: put into operation the capacity for the production of 10,000 such trucks in the 11th Five-Year Plan. This objective is realistic. The plant has successfully

completed the first year of the Five-Year Plan and has been awarded the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, VTsSPS [All-Union Central Council of Trade Unions], and the Komsomol Central Committee, and its name has been recorded on the All-Union Honor Roll at the Exhibition of Achievements of the National Economy of the USSR. At the present moment feverish activity is under way to introduce new equipment and the latest technology and automate the production processes.

The goals for reconstruction of the existing facilities have been defined in the plant development plan approved by Minavtoprom [Ministry of the Motor Vehicle Industry].

V V Trubeyev, director general of the UAZ Production Association, says: "We plan to begin delivery of the trucks specifically designed for agricultural use next year. Since the design of the Ural-5557 truck differs significantly from the machines now being produced we plan to construct several new departments. This includes the main facility, which is planned for completion in 1985. A new primary production line is also planned for startup at this same time. In the 1983-85 period construction and assembly operations costing 8 to 10 million rubles must be completed each year. The Uralavtostroy Trust is carrying out the construction."

According to the plan five bays of the production part of the main facility will be constructed using the progressive block-conveyor technique, which makes possible very definite time savings. Unfortunately from the very beginning the organization of the construction operations has not been in accordance with the plan.

The Trust is now behind schedule. Since the first of the year somewhat more than 1.1 million rubles worth of construction work (of the annual volume of 4 million rubles) has been completed. It is obvious that in the resolution of this admittedly complex problem the Trust requires immediate assistance from Glavyuzhuralstroy Mintyazhstroy SSSR [Main Administration for Construction in the South Ural Region of the Ministry of Heavy Construction of the USSR].

Because of the delay in the construction of the main facility the production organization has developed a "backup" variant of the plan for production next year of the first lot of agricultural vehicles. Plans are to temporarily locate the production of these vehicles in the design-office and laboratory building and some bays of the automated machining building. It is obvious that resorting to the "backup" technology is a forced measure and will be extremely unfavorable economically.

In the process of preparation for production of the new truck it will be necessary to introduce the fabrication of 1,200 individual new components and parts. For this it will be necessary to design and fabricate various fixtures of a total cost of 5.2 million rubles.

The CPSU Gorkom and the Party Committees of the auto plant and the construction trust must take realistic measure to eliminate any problems interfering with the realization of this critical task.

9576
CSO: 1829/298

ACCELERATING INNOVATIONS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Jul 82 p 2

[Article by A Valentinov: "A View From on High"]

[Text] V Chernyaykin, deputy director of NAMI [Scientific-Research Institute of Motor Vehicles] says: "We are the lead institute of the industry and are responsible for resolving problems in a systematic fashion, with account for the long-term future; as you well know, such serious work takes time...."

"So let's talk about specific developments which are ready for introduction...."

"It's too early for that, 2 years is not long enough to..."

Letters from many innovators to our editorial board had led me to visit NAMI. These letters concerned the fact that NAMI is assigned the responsibility for evaluating and recommending for introduction all innovations in the motor vehicle construction field. But some of the institute personnel exercise this right in a very unusual fashion: they reject "offhand" most of the innovator suggestions. Specifically, the letters have talked about suggestions directed toward reducing fuel consumption.

Everyone knows the importance of this problem, particularly the Institute personnel. Two years ago NAMI's activity in the fuel economy field was checked out by a joint commission of the Party Control Committee of the CPSU Central Committee and the People's Control Committee of the USSR. The conclusions of this commission stated:

"The Institute does not carry out any fundamentally new or original scientific developments, does not conduct a search for those progressive technical solutions which could become the basis for the creation of new vehicles during the 11th and 12th Five-Year-Plans and could ensure the industry a dominant position in international motor vehicle construction. Most of the scientific-research and experimental-design studies relating to improving fuel economy, which appear in the Institute plans as "probing studies," are in reality repetitions of studies already carried out in international automotive practice or in allied industries...."

The question naturally arose: what has the Institute done to improve truck fuel efficiency after these serious criticisms? But in answer Chernyaykin could not name a single large-scale development introduced during the last 2 years. Then the conversation quoted above took place.

There is no argument: the lead institute of the industry should look to the future. But even academic personnel try to combine fundamental investigations with specific application to practice. After all, 2 years is not such a short time and all the efforts at NAMI after reorganization did not start from scratch. Finally, even while involving themselves with "global" tasks, the personnel of the Institute hardly have a moral right to ignore specific suggestions, the introduction of which can ensure significant immediate fuel savings.

V Revin, a Kirovograd driver, made one such suggestion to NAMI. As early as 1971 he had modernized the oil filter for the engine of an old Volga--a GAZ-21 model. His filter was tested at the Transcaucasus State Machinery Test Station, and they found that it reduced by several fold the contaminant content in the motor oil, particularly those contaminants that cause premature engine wear and therefore increase the fuel consumption. But M Grigor'yev, chief of the NAMI reliability laboratory, not only refused to test the new filters but also refused to study the engine of a truck which had traveled 419,000 kilometers with these filters without an overhaul.

In his conversation with me Grigor'yev said: "I don't deny that the Revin filter may actually clean the motor oil very well, but it is not a full-flow filter; only part of the oil passes through the filter. The whole world long ago switched over to full-flow filtration, so the Revin filter is a step backwards. We tried to show him this but he did not accept our arguments...."

Here Grigor'yev is wrong; Revin understood the laboratory's arguments. But he decided to check them; he installed his filter on a recent Volga with an engine using full-flow filtration. And again the tests, which were conducted not only at the Transcaucasus Station but also at the Institute of Additives Chemistry of the Azerbaijan Academy of Sciences, showed the following: the Revin filter works better in the new Volga than the production-type full-flow filters.

Someone might think: maybe the scientists are right, there's no reason to return to a problem that has already been solved by the international motor vehicle construction industry. But the fact is that the engine for which the Revin filter was developed continues to have problems, both in hundreds of thousands of old Volgas and in stationary installations. Moreover, as they told me at Minavtoprom [Ministry of Motor Vehicle Construction], the industry continues to produce each year thousands of such engines with partial-flow oil filtration. On these vehicles the Revin filter could save the nation many thousands of metric tons of fuel, were it not for the opposition of NAMI.

What has led to this attitude toward innovator suggestions?

The director of the institute, V Anufriyev, told me: "The whole problem is that we have a tremendous workload, our personnel are loaded to the limit. Andy they consider each idea "from the outside" (on which they must spend

time) to be an interference with their primary work. Particularly since by no means every idea is worthy of examination. Therefore the scientific personnel gradually develop a critical attitude toward the suggestions of nonprofessionals."

While Anufriyov was saying these words, I had the feeling that he was trying to justify the mistakes of his coworkers by citing "objective" factors. And "oh" how difficult to break down the ingrained "traditions" and "concepts" in the years that he has headed the institute. He did not have enough time to delve into the decisions of his underlings. Otherwise he would have picked up the documents and found that during the last 2 years 95 innovator suggestions directed toward fuel efficiency have been received by NAMI. For an institute with a staff of about 3,600 and which can draw on specialists from the entire industry the examination of these proposals is not a very burdensome task.

But the director was certainly right on one thing: a biased view of the nonprofessionals is preventing some NAMI personnel from finding the "rational grain" in the suggestions submitted and is forcing them to pass over some obviously good proposals. Incidentally, the attitude of the NAMI personnel to the suggestions of the professionals (their own colleagues) is no better.

The conclusion of the previously mentioned commission noted specifically that: "... The Institute shows no interest in developments from other industries. Thus, TsNITA [Central Scientific-Research Institute of Fuel Control Apparatus] of Minsel'khosmash [Ministry of Agricultural Machinery] developed in 1975 a patentable film-vaporizing fuel injection system which has several advantages. In spite of the directive from the administrative bodies that the studies in this field should be expanded, NAMI did not organize any further improvement of the process or preparation for its introduction into production."

In November 1980 a directive of the USSR State Committee for Science and Technology was adopted, which stated the following: "We approve the 1981-82 NIR [scientific-research work] and OKR [experimental-design work] plan for the development of film-vaporizing fuel injection systems with electronic control for engines of the VAZ [Volga Auto Plant] type, which will provide 18-20 percent reduction of the fuel consumption under operational conditions and reduce by a factor of 1.5-1.7 the toxic components in the exhaust gases...." The organizations assigned to carry out this work included NAMI as well as TsNITA and other organizations.

How have the NAMI personnel approached this problem? When I put this question to the director of TsNITA, Yu. Sviridov, his reply, to say the least, did not include any words of gratitude: "The participation of NAMI was actually limited to the fact that it financed part of our efforts for 2 years. We send our reports to the Institute and they accept them. The Institute people are not interested in anything more. At the present time NAMI has decided to drop participation in this problem and has suggested that we work directly with VAZ. But VAZ has refused to use our system on the production machines. They suggested that we work together with the design bureau for rotary combustion engines, which are still in the experimental stage...."

Trying to clarify the situation, I again talk with Chernyaykin at NAMI.

He says: "The film-vaporizing injection system makes it possible to do away with the carburetor. But at VAZ there is a very large carburetor production department, where thousands of people work. You can't close this operation down! Particularly since the new system requires electronics. Who will handle the electronics?

"But it's precisely your Institute, worrying about the future, which should support valuable innovations, and if necessary pose the question to the ministry."

"I don't have too much faith in this system. It seems to me that a more promising approach is the vortex charging system, developed at our institute. Although it reduces the fuel consumption by only 10 percent it is simple in realization, only the shape of the combustion chamber needs to be changed...."

So we have completed the full circle: everything that is not developed at NAMI, particularly anything that is done in another industry, is not worthy of attention. The story told in a letter to the editor from P Bashmakov, electrical technician, confirmed to me that some NAMI specialists back this "position."

In 1974 Bashmakov developed an instrument for fast diagnostics of ignition plugs, poor operation of which leads to incomplete fuel burnup and increased fuel consumption, premature engine wear and contamination of the atmosphere. Our car and truck fleets have instruments which make it possible to check the plugs. However to accomplish this the plugs must be removed from the engine, taken to the test stand and connected to the instruments. This operation takes the driver of a motor bus, for example, about an hour. But the Bashmakov instruments (which fit into the palm of the hand) make it possible to check in a few minutes not only the plugs but also the high-tension wiring. And right on the vehicle.

After the demonstration of these instruments at VDNKh SSSR [Exhibition of Achievements of the National Economy of the USSR] many enthusiasts themselves fabricated the instruments and introduced them in some of the Moscow motor bus fleets and in the motor vehicle fleets of other cities. The Vitebsk Electrical Measurement Instrument Plant decided in 1975 to initiate production of these instruments as consumer goods. This required only one thing--that NAMI approve the new item. But the Bashmakov instruments were turned down in the Laboratory of Garage Equipment and Technical Diagnostics.

What were the bases for this? Actually--none. Today, after my conversation with the director of NAMI, laboratory chief A Kharazov quickly changed his opinion of the Bashmakov instruments.

He told me on the phone: "Departmental barriers are the cause of the entire problem. These instruments are very necessary, both in the motor vehicle fleets and for the owners of private machines. But their production should be organized by Minavtotrans [Ministry of Motor Vehicle Transportation]. However they don't seem to know anything about Bashmakov...."

"So why don't you suggest to them...."

At the other end of the line there seemed to be some hesitation: "Not us--that's not the way things are done. Only Minavtoprom can make a proposal to Minavtotrans...."

"Then recommend to Minavtoprom that they do this."

"You don't see--they won't understand: we're an industry institute and we can't suddenly intervene in the affairs of another ministry. No, this should be done by an outside organization. But suppose your editorial board came to us with an official inquiry--I promise you I'll give the Bashmakov instruments a very flattering recommendation." To be honest, I really did not understand why the "departmental considerations' didn't keep the laboratory personnel from closing the door on the Bashmakov instruments, or why now, when it's necessary to correct the error, this same "departmentalism" has turned into an insuperable obstacle. But I agree on one thing: let's hope that both Minavtotrans RSFSR and Minavtoprom consider this article an official letter. Only not from an "outsider" but rather from a concerned organization.

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CSO: 1829/298

BRIEFS

TRANSPORT OF FUTURE--In large cities the bulk of passengers are carried by an underground railway. Its construction, however, calls for great capital investments. It pays off only in cities with a population of over a million. But in cities with 600,000-800,000 inhabitants and in new neighbourhoods of cities with a population of over a million, where no underground railway has yet been built, surface transport--bus, trolleybus and tram--cannot cope with the flow of passengers. Soviet scientists and designers believe that this problem can be solved by providing a high-speed, ecologically clean, noiseless and relatively cheap means of transport with a considerable carrying capacity, which would cost 4 to 6 times less than an underground railway. This is a vehicle on electromagnetic suspension. Soviet specialists from the All-Union Scientific Research and Design Institute "Transportprogress" working to develop trains running on electromagnetic suspension have advanced the idea of a train held over the rails by an electromagnetic field and driven by a linear electric motor. The first trials have confirmed the correctness of the designers' idea of an articulated joint by means of which the five bogies making up the running gear of the future vehicle should be interconnected to allow curvatures of the route to be easily negotiated. The trains, capable of developing a speed of up to 500 km/h, will run on special 5-7 m high overpasses laid over the central dividing lines of major avenues and highways. Electromagnetic suspension transport is naturally not a matter of the near future. Specialists believe, however, that by the beginning of the 21st century it will be as common on urban and suburban lines as the tram or the trolleybus in the streets today. The 26th CPSU Congress set the task of extending the sphere of application of new transportation facilities for urban and suburban traffic. To develop and put into service electromagnetic suspension transport would be a feasible way of fulfilling this task. [Moscow SOVIET MILITARY REVIEW in English No 6, Jun 82 p 35]

UNDERGROUND PALACES--The Yerevan Metro is the Soviet Union's eighth. Although commissioned just eighteen months ago, it is extremely popular. Yerevanis are particularly proud of the interior decoration of the stations. The underground rails' length stands at 7.5 km so far but development prospects are great. In ten years, practically all districts of the Armenian capital will be connected by underground lines. The map is designed in such a way that even the longest underground trip should be no longer than 20 minutes. Total length is envisaged to reach at least 40 km. ["Moscow MOSCOW NEWS in English No 26, Jul 4-11, 82 p 14]

CSO: 1812/176

ARCTIC DRILLER DELIVERED BY FINNS

Moscow VODNYY TRANSPORT in Russian 20 Jul 82 p 4

[Article by G. Topuridze, departmental editor of the magazine NEFTYANIK: "Arctic Marine Drilling Vessels"]

[Text] It is difficult to surprise the people of Murmansk with unusual vessels: they have seen a great number of the most differing classes and purposes and vessels under the flags of all the countries of the world. Yet even many former sailors were surprised when the unique drilling vessel "Valentin Shashin," built for the Soviet Union in Finnish shipyards, first arrived at Murmansk.

Its dimensions are impressive: length 149.4 meters, beam 24 meters, freeboard 12.65 meters, draft 7.3 meters. A drilling rig capable of drilling wells to a depth of 6,000 meters in up to 300 meters of water rises up more than 50 meters amidships.

Why do they call it unique? Because the "Valentin Shashin" is the world's first drilling vessel of the ice class, capable of operating effectively in Arctic seas. Should a danger occur, for example, of an approaching large iceberg, with special equipment the vessel can leave the drilling point in 3 minutes and then return to it and continue operation. The "Valentin Shashin" can move through solid ice behind an icebreaker.

Many up-to-date systems and devices have been installed on the new vessel. For example, the system for dynamic positioning. The vessel will be held at the drilling point by transverse steering devices installed on the sides of the bow and stern. They operate according to signals received from space and processed on a computer. There is a helicopter pad in the stern, which is where replacement crews of sailors and drillers will arrive, along with foodstuffs, supplies and equipment necessary for normal operation.

Not all of the sailors know who the new drilling vessel was named after. Valentin Dmitriyevich Shashin was USSR minister of petroleum industry. His entire life was bound up with development of the sector, in V. D. Shashin began his career as an apprentice lathe operator. He devoted all his energy to furnishing petroleum to the country, and he constantly strove for what was new and paid very great attention to creative exploration of progressive solutions.

V. D. Shashin's merits have been highly praised by the homeland. He was awarded four Orders of Lenin, the Order of Labor Red Banner and many medals. V. D. Shashin was awarded the Lenin Prize for development of technical progress in the sector.

When the "Valentin Shashin" arrived at its home port of Murmansk, the vessel's crew was met by the former minister's widow L. F. Shashina. She had a tour of the unique vessel, talked about her husband, and delivered documents and photographs of V. D. Shashin for the ship museum.

At this ceremony speeches were made by the vessel's captain, M. A. Zhuravlev, the chief of the drilling rig, V. I. Generalov, and others. They spoke about how the crew of the vessel bearing V. D. Shashin's name was ready to maintain the honor of the country's marine petroleum and gas drillers with new discoveries.

The arrival of "Valentin Shashin" at Murmansk is a vivid new testimony to the stronger business cooperation between the USSR and Finland. As has now become known, the Finnish firm Rauma-Repola was to have received a part of the equipment for the vessel under contracts from American companies. But the Reagan Administration placed an embargo on these deliveries in an endeavor to prevent the Soviet order from being filled. And the Finnish specialists themselves manufactured this equipment, and a portion they purchased in other countries. Orders for the USSR are providing work for thousands of people at Rauma-Repola plants and shipyards. Here is what the firm's deputy general director, (Vyayne Lassila), said: "Trade with the Soviet Union is very important to our firm. For example, in 1981 about 35 percent of its output was delivered to the USSR. We have just delivered a drilling vessel for operation in Arctic waters. Another two vessels in this series will be delivered during this year. The mutually advantageous collaboration between our countries is continuing to expand."

7045
CSO: 1829/274

ROBOT INTRODUCTION URGED IN RIVER FLEET ENTERPRISES

Moscow RECHNOY TRANSPORT in Russian No 6, Jun 82 p 30

[Article by A. Kamenev, candidate of engineering sciences, and V. Silant'yev, engineer, Leningrad Institute of Water Transport: "Robots and Manipulators Are Needed"]

[Text] At industrial enterprises of the MRF [Ministry of River Fleet] 56 percent of the workers are employed at manual labor, and 70 percent of these work in the principal production operation. Reducing their number and increasing the productivity of labor at those enterprises is possible mainly by introducing mechanization equipment. At the present time the level of mechanization varies from 20-26 percent in the work of mechanics, electricians, cleaning personnel and painters to 40-48 percent for the work of cabinetmakers, machine tool operators, salvage operations and materials handling. On the average 34 percent of the labor has been mechanized in hull shops. When all types of work are taken into account, this indicator for industry of MRF is about 38 percent.

The planned mechanization recently done and measures to organize production have made it possible to increase output with the same number of production workers. But in the 1981-1990 period and over the longer range conditions will become fundamentally different. Because of an increase in the average vessel age, an ever larger number of them need major repairs, the volume of which will grow every year. Replenishing the fleet with ships of more complicated design equipped with automatic mechanisms, additional devices and systems will involve a rise in labor intensiveness and will make their construction and repair more complicated.

At the same time, in a situation when the country's labor resources will be utilized first of all along the key directions of the economy such as carrying out the fuel-and-power and food programs, one can expect a reduction in the size of the work force in the industry of MRF. In view of the age-specific composition of the work force, the number of production workers may drop.

Calculations show that the level of mechanization will have to be substantially increased to handle the growing amount of production with a smaller work force. At the same time the organization and management of production

will have to be improved at a faster pace on the basis of scientific management. Between 1970 and 1980 the level of mechanization of production at enterprises of MRF rose only 9.5 percent, and over the last 5 years the annual growth was only 0.6-0.8 percent, and there is an evident tendency toward a further reduction. It should be taken into account that performance of measures to develop and organize production will involve sizable capital investments necessary to build specialized ship repair yards, shops and sections.

It is accordingly becoming necessary to apply to production in the shortest possible time industrial robots and other qualitatively new mechanization equipment, which must be created on the basis of manipulators.

As demonstrated by domestic and foreign experience, the use of industrial robots is becoming expedient and possible provided the production process is fully automated, that the machine time of the production cycle is matched to the operating cycle of the robots, and that all supplemental operations are automated (except for those performed by the robots). In addition to that, workpieces and tools must be given a set position and orientation.

The organizational measures which have to be performed in connection with the introduction of robots include the following: specialization of production, creation of plants and shops with a limited products list and a production run of at least 10,000 parts or products per year, widespread industrial cooperation and standardization of the products manufactured.

With regard to the technological preparation of production, it should be recognized that robots can be used only if shops are equipped with machine tools that have numerical programmed control and are equipped with attachments to grip and hold the parts and transfer them to the succeeding operations and also load-feed devices consistent with the operating pace of the section. The training of adjusters has great importance.

Thus introduction of the new mechanization equipment at enterprises requires retooling of production, a change in its organization, and improvement of its management.

At the present time the world industry has created and applied about 20,000 industrial robots, 60 percent of them being used on flow lines in the motor vehicle industry. At enterprises of Soviet industry they number about 6,000. This equipment has become most widespread in forging (35 percent), in mechanization of metalworking (25 percent), in materials handling (10 percent), and in foundry work (8 percent).

For all practical purposes industrial robots cannot yet be used in performing such operations typical of ship repairs and shipbuilding as electric welding, fitting and assembly and typing work.

A survey of one of the yards done by the head organization for robotics showed that at the present time it is not as a practical matter feasible to use industrial robots in many shipbuilding operations.

Their use is realistic in preparatory and painting operations including the external services of ship hulls both in shipbuilding and also in ship repair. In all other operations it is most advisable to introduce manipulators equipped with tools.

In the building of marine engines the use of robots is feasible in machine shops, foundries and forges and also in heat treatment and galvanizing.

The level of specialization, the size of the production run called for in the program and the technical level of production should be the criteria in deciding questions of equipping production sections at plants of the MRF with industrial robots and manipulators. On this basis their introduction can be recommended at the same time for the fuel apparatus manufacturing sections at the Klebnikovskiy and Kuybyshev plants, the production of bearing bushes at the Togliatti plant, ship's fitments at the Gorodets and Akhtubinsk plants and at the SSRZ [Shipbuilding and Repair Yard] imeni Uritskiy.

It is feasible to use robots and manipulators in manufacturing crankpins and piston rings (Gorodets SRMZ [Ship and Machine Repair Yard]), in the manufacture of diesel pistons, cylinder sleeves, and piston rings, as well as in the section for chemical-thermal treatment of parts (Nevskiy SSRZ).

It can be recommended that they be furnished to the forging section of the SSRZ imeni III Internatsional, the foundries at the Kalachevskiy and Omsk plants, the Teplokhod Plant and the chain manufacturing section at the Krasnyy Don Plant.

The labor intensiveness of production in these shops and sections is approximately 3.3 million man-hours, and the size of the production work force in one-shift operation about 1,700. As experience has shown, the use of two industrial robots replaces at least three machine tool operators. We can therefore assume that when the operations other than machining metal are taken into account, the total need would be approximately 800 robots.

Rough calculations show that the drop in the production cost would be at least 850 rubles, additional capital investments would amount to 30 million rubles, and the benefit from use of the workers replaced would be 3 million rubles and that of the equipment replaced 1.3 million rubles.

The annual economic benefit from introduction of robots in these sections is estimated at 1.7 million rubles. Thus the payoff period, taking into account the aggregate economic benefit, would be about 6 years.

It should, of course, be borne in mind that a number of factors cannot be taken into account in the calculations at the present time. This applies first of all to the additional outlays for measures related to the organization and management in production and scientific management, depreciation of the value of machine tools, robots and special attachments, the cost of the power consumed, outlays for personnel training, the cost of spare parts and materials. These costs could reduce the economic benefit. At the same time factors increasing efficiency could not be taken into account: the rise of labor productivity and also consequences of a socioeconomic nature.

The conclusion can thus be drawn that the use of industrial robots and manipulators at plants of the MRF is economically feasible over the next 10 years.

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CSO: 1829/284

CARRIERS ON SMALL RIVERS LACK MOTIVATION

Moscow VODNYY TRANSPORT in Russian 19 Jun 82 p 2

[Article by G. Vstavskiy: "'Reefs' on Small Rivers"]

[Text] Petroleum and gas workers in Tyumen and Tomsk Oblasts requested shipments of 8,735,000 tons of cargo on small rivers. The rivermen included in the plan only 6,019,000 tons. In 1985, according to preliminary calculations, 4,250,000 tons will not be accepted, and in 1990--5,200,000 tons.

Why did the Irtysh and West Siberian Shipping Companies not include many requests of the Siberian oil and gas field workers in the plan?

The question is especially crucial because today the growth rates of shipments in the Ob'-Irtysh Basin are the highest in the sector. While the total increase in river freight traffic in the current 5-year plan is 19-90 percent, growth for the Irtysh Shipping Company, for example, exceeds 30 percent. This will mainly occur through an increase of shipments on small rivers, which in the present stage of development of the West Siberian Petroleum and Gas Complex are becoming the principal transportation arteries. Shipments will increase at especially rapid rates on the Nadym, Agan, Vakh, Pur, Kazym, Vasyugan, Parabel'....

But because there are not enough small-tonnage vessels the rivermen have the greatest difficulties fulfilling the planned volume of cargo to be carried to the petroleum and gas fields. For example, of the 4 million tons which the rivermen of the Irtysh Shipping Company delivered in 1981 to small rivers, only 600,000 were carried in shallow-draft vessels. The shortage of these motor vessels has had the result that a sizable portion of the cargo is not reaching the fields. But the trips of the large ships are expensive because of numerous cases of damage to the hull and propulsion and rudder systems.

It would be wrong to say that the watermen of West Siberia are not receiving vessels. Every year convoys of vessels go to the Irtysh and Ob' from other basins. There is also replenishment from their own shipbuilding. In 1981 the Irtysh Shipping Company, for example, received 102 vessels, only 22 of them for operation on small rivers. The situation is compounded by the fact that a sizable portion of the small-vessel fleet available is just about to be written off in terms of its length of service. On the Irtysh alone 120 vessels are to be written off by 1990. What is the way out?

The fleet can be replenished by developing a shipbuilding capability in Siberia. Such possibilities exist at the Tyumen Shipbuilding and Ship Repair Yard and at the Samus, Moryakovskiy and Tobolsk REB's [repair and operations depots] of the fleet.

And further. In 1978 a decision was made to build shipbuilding shops in Tavda, Tara and Tobolsk. Unfortunately, even today there is silence at these construction sites. Yet the rivermen were supposed to receive several dozen vessels a year from each of them. At Tavda, for example, deliveries were planned back in 1979. Another yard which was supposed to be built in the Ob'-Irtysh Basin has also remained in the design stage, just as before.

Existing enterprises could be made considerably larger. For example, the Tyumen Shipyard, which builds floating power plants. Work is done there mainly on one shift: there is a shortage of manpower. This collective, as noted at a conference of the interdepartmental regional commission for development of the West Siberian Petroleum and Gas Complex, needs help in building social welfare facilities.

Another way is more efficient utilization of the vessels operating on small rivers. Interesting figures were presented at the conference of the interdepartmental commission: as of 1 January of this year the two shipping companies had 490 small vessels on their books, while the petroleum and gas workers in Tyumen had nearly 3 times as many--1,200 units.

How are those vessels of private carriers being employed? Specialists believe that the shipping costs of vessels of other ministries are fivefold greater than in the MRF [USSR Ministry of River Fleet], and tenfold greater on other rivers. As we see, the potential for improving utilization of the fleet is very great. How are they to be put at the service of the 5-year plan?

It would seem that the ideal way is to turn over the departmental fleet to the watermen, who are the real masters of the river. This has been discussed more than once already in our press. But so far neither the rivermen, nor other shipowners are prepared for such a step. The experience on the Tom deserves attention in this situation. So that the traffic of cargo to the Vasyugan and Chuzik could be handled, the fleet of the petroleum workers and geologists was put undel the operational control of the shipping season headquarters. All the cargo was properly delivered in the shortest time. And why not set up a unified operational headquarters for the 82 shipping season in Tyumen Oblast?

There are also other ways of increasing the efficiency of the fleet's operation. This is to make the small rivers truly navigable. Today the Irtysh Basin Waterway Administration alone is attending 46 small rivers, and their length is 10,356 km. But only 3,643 km have guaranteed dimensions of the river channel. It is well known that more vigorous use of these waterways would require considerable channel-dredging operations and the cleaning of beds and basins. This would necessitate very large capital investments beyond the ability of the waterway maintenance organizations alone. The decree of the CPSU Central Committee and USSR Council of Ministers entitled "On Measures

To Develop River Transport in the 1981-1985 Period" stated that tributaries should be developed at the expense of customers: enterprises of the Ministry of Petroleum Industry, Ministry of Gas Industry, Ministry of Geo.... But they are not very willing to conclude such contracts with the waterway maintenance organizations on the Irtysh and the Ob'. During the last shipping season only two contracts were concluded: for maintaining a section of the Agan River (Glavtyumen'neftegaz [Main Oil and Gas Administration of Tyumen Oblast]) and the Taz River (Glavtyumen'geologiya [Main Administration for Geology of Tyumen Oblast]). But even these main administrations did not fulfill their obligations, and the associations Tyumen'gazprom and Tomskneft' altogether refused to put up their share in developing small rivers. This narrowly departmental approach is causing harm to the general cause.

It is not the first year that waterway maintenance organizations on the Irtysh have pleaded for replenishment of the dredging fleet. There is a particular need for marine dredges to work bars in the Gulf of the Ob' as well as estuary sections of the northern rivers. It cannot be forgotten that the rigging up of the new gas deposits at Yamburgskoye and Zapolyanoye, where they cannot do without heavy-duty and reliable equipment, is to begin during this 5-year period.

The choking up of rivers and basins is a serious interference to the work of the rivermen. For instance, shipping has been entirely closed to such rivers as the Mega, Bolshoy Balyk and Trom-Agan through the fault of consignees.

Nor is that all. The rivermen incur considerable costs maintaining service on small rivers in the Ob'-Irtysh Basin. It costs as much in terms of labor to carry 1 ton to the tributaries as it does to deliver 3 tons on the main route. And naturally these hauls tend to detract from the economic indicators of the shipping company's performance. They have known about this in the ministry for a long time, but in planning and giving assignments they do not take into account the coefficient of labor intensiveness. A paradox comes about: the further the rivermen go in developing service on the small rivers, the more problematical it is for them to fulfill their planned production and economic assignments. All of this is unconditionally holding back initiative in developing new flows of cargo. It is time that the appropriate administrations of the ministry work out a system of financial and nonfinancial incentives for the organization of shipping on small rivers and in the Ob'-Irtysh Basin above the Arctic Circle so as to take into account the coefficient of labor intensiveness.

Yet another way of efficient utilization of the small rivers is to speed up the turnaround time of the fleet. The intensity of cargo traffic on the small rivers of the Irtysh Shipping Company, for example, is only half of the average figures. Nor is there anything surprising in this. Most of the consignees have not developed dock facilities, and there is a shortage of cranes. There cannot be any question of speeding up cargohandling when not a single dock has been built since the beginning of commercial exploitation of petroleum in Tomsk Oblast! Docks are being built slowly by the Ministry of Petroleum Industry at Katylga (Vasyugan River) and on the Vakh. Back in 1978 the geologists joined the Irtysh Shipping Company in drafting measures to build

mechanized container docks at Novoagansk, Krasnosel'kupsk, Gaz-Sale, Urengoy, and Tarko-Sale. But so far these docks do not exist. The Ministry of Petroleum Industry has not built piers for loading heavy cargo at Pokachi, Novoagansk and Russkinskiye, nor a dock at Kilometer 223 of the Taz River. There are many such examples. That is the reason why the above-allowance idle time of ships on the premises of customers has been growing every year. In the 1981 shipping season the fleet of the Irtysh Shipping Company alone lost 1,437,000 tonnage-days above the allowance at the piers of the Ministry of Construction of Petroleum and Gas Industry Enterprises, 613 tonnage-days in the berths of the Ministry of Petroleum Industry, 864 in the Ministry of Gas Industry and 563,000 tonnage-days at the docks of the Ministry of Geology.

The Siberian oil workers, as we know, are receiving aid on a patronage basis from other regions of the country. In particular, the builders of Leningrad have committed themselves to building housing and facilities for social, cultural and consumer services in Novyy Urengoy and the Moscow builders at Nizhnevartovsk. Those who have been sent from Kazakhstan are building up-to-date roads for the oil workers of Strezhevoy. The aid of the fraternal republics and cities cannot be overestimated. But why should the boundaries of patronage not be expanded? After all, without an advanced river transport it will be difficult to build those same cities and settlements, to lay the petroleum and gas pipelines and build the roads.

The shipping season of the second year of the 5-year period has come to the rivers of West Siberia. And in spite of the difficulties the rivermen on the Irtysh and the Ob', supporting the initiative of those who began the competition in the sector, are striving from the first trips to maintain a high pace in delivering cargo to the oil and gas fields of West Siberia.

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OCEAN AND RIVER

VESSELS, CONSTRUCTION, COOPERATION NEEDED ON SMALL RIVERS

Moscow STROITEL'NAYA GAZETA in Russian 26 Jun 82 p 2

[Article by P. Drachev, deputy chief of the West Siberian River Shipping Company: "Inaccessible Shores"]

[Text] In its transportation service Tomsk Oblast is pronouncedly river-oriented: vessels of RSFSR Minrechflot [Ministry of River Fleet] and other departments carry about 80 percent of all the freight traffic. STROITEL'NAYA GAZETA has consistently covered the problems of shipments of cargo along the rivers of Western Siberia. The articles "To Each His Own Ship," "Long Way to the Dock," and others have found a response in USSR Gosplan, RSFSR Minrechflot, Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] and other organizations and have helped to improve operation of transportation equipment in the region.

The volume of freight carried just for the oil workers in the north of Tomsk Oblast has increased 2.7-fold over the last 5 years. But its further growth is encountering serious difficulties.

Toward the end of the last shipping season the manager of a major construction contracting organization called the port of Tomsk: a shipment of bricks and reinforced-concrete products for panel houses needed to be delivered urgently to the Vasyugan deposit. Upon learning that it was practically impossible to fill the order because of the imminent low water, he began to get worked up over the rigid limits of the shipping season and the rivermen's "procedures."

These "procedures" are in large part dictated by nature itself, which leaves only 1.5 months open every year for use of the small Siberian rivers. But there is a way out: the conditions for shipping have to be improved.

The major portion of the petroleum and gas prospected in recent years is located in remote areas--the interfluves of the Vakh, the Chuzik, the Parabel', and the Vasyugan. The most promising of them are the Vasyugan and Pudino deposits, which are the basis for planning almost the entire growth of extraction. Located on left tributaries of the Ob', they present great difficulties for transportation service.

For example, in Pudino, which is in the upper reaches of the Chuzik, only 25,000-30,000 tons of cargo can be delivered in a season because of the problematical shipping conditions. Last spring the maximum level of the Chuzik was almost 1.5 meters lower than usual. The sharp drop in the stage that followed limited the working period for barges with a capacity of 600 tons to only 10 days. To put it straightforwardly, a menacing situation was created. On the initiative of the Tomsk port workers about 60 small-tonnage vessels of the West Siberian Shipping Company and of the associations Tomskneft' and Tomskneftegasgeologiya were concentrated on the Chuzik. The building materials, equipment and food which had been ordered were carried with great effort to their destinations thanks to the joining of forces.

And then the premature low water on the Vasyugan brought serious complications. The 1,000-ton barges were able to make it only halfway, and then they were towed back to the Ob' for transshipment of the cargo to small vessels. The rivermen have aptly nicknamed an expensive operation like this a "whirligig."

Enlisting a variegated armada of small vessels on an emergency basis does not solve the problems. Specialized vessels are needed. The most preferable are motor vessels of the No 861 and T-63 types, the tugboats P-96, 1587 and 911, and dry-cargo barges from 200 to 1,000 tons. The need for such vessels exceeds 100 units at the present time.

Nor are docks being arranged for us. At present these are as a rule rudimentary sections of the shore without any sort of special devices and machinery. Because of the low level of mechanization the flow capacity of the docks is extremely low. Vessels stand idle for extremely long periods of time during cargo-handling operations. If it were not for that idle time, over just the last 5 years we could have carried an additional million tons of cargo with the same fleet.

The development of the Siberian rivers is lagging so far behind the region's overall pace of development that even a substantial replenishment of the shipping company's vessels will not be able to guarantee the necessary growth of cargo traffic. And the pace that has been set is extremely high: in the coming 10-year period the volume of traffic on the small rivers of Tomsk Oblast is supposed to increase from 1.3 to 3 million tons per year.

The total capital investments which RSFSR Minrechflot, the Ministry of Petroleum Industry and Minneftegazstroy are to use in the 11th Five-Year Plan for the West Siberian Shipping Company has been set at 149 million rubles. A part of that amount will go for deliveries of new vessels, and part for construction of mechanized docks at Strezhevoy, Okhteurye, Katalga, Tomsk and other points.

This will make it possible to eliminate the intolerable gap between the needs of traditional clients and the capabilities of the rivermen.

But the important construction program is not being backed up with the resources of construction contractors. Principal reliance is being put on the direct-labor method of construction, but it does not afford the anticipated

benefit. For instance, the dock at Okhteurye should have received its first vessels last year, but it is hardly ready even now: only about 7 percent of the remainder of the estimated cost of 835,000 rubles has been accomplished in 5 months.

The dock at Strezhevoy (whose opening was planned at the end of the 5-year period) was not worked on at all last year though the funding was available. This year only about 40,000 rubles of the planned 700,000 were used on this dock. The docks of the Tomsk Regional Construction Administration are not being built in Strezhevoy and on the Vakh, nor are the dock facilities with crane machinery in Tomsk, though the plan for construction and installation work exceeds 1.3 million rubles on these three projects. That means that the shores will remain as before inaccessible to intensive cargo operations.

Recently the initiative of the people in Leningrad was followed in concluding agreements for cooperation among the collectives of the Tomsk Riverport, the Tayga Railroad Division, the oblast trucking administration and other sectors of the economy on joint development of the industrial and transportation complex. The decisive role here will, of course, be played by the best prepared and most experienced partners of the rivermen--the Tomsk Regional Construction Administration and the construction trusts of Tomskgazstroy and Tomsktransstroy [Tomsk Oblast Administration for Transport Construction]. At present they are clearly taking a waiting position, not getting very disturbed about the consequences.

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CSO: 1829/274

NORTHERN SEA ROUTE CHOKED BY LOCAL TRAFFIC

Moscow VODNYY TRANSPORT in Russian 12 Jun 82 p 2

[Article by V. Mertsalov: "Tactics Working Against Strategy"]

> [Text] Yet another winter in the Arctic has passed. The sailors have overcome all the difficulties which nature heaped on them with honor. But not all of the difficulties in their work have been exclusively related to the weather. Often there were interruptions that arose because the operation of the icebreaker fleet was not organized efficiently enough, because ships were held in port, because they did not receive supplies on time, and so on.
>
> The newspaper has already talked about this repeatedly in its pages. Yet this will again be the topic in the report from our correspondent being published today. The problems of the winter Arctic shipping season have to be solved in advance if future trips in these difficult latitudes are to take place without excessive complications. It would seem that their discussion would help to avoid repetition of errors in the future.

"... The 'Yuriy Dolgorukiy' sails from Arkhangelsk for Dudinka on 26 January," I was told by the people in the ASMP [Administration of the Northern Seaway] when I decided on taking the trip to do a story. When the day before, as I was taking off from Sheremetyevo, I again called the ASMP just to be sure, they confirmed the date.

However, we departed from Arkhangelsk only a week later, and then only thanks to the vigorous instigation of Grigoriy Alekseyevich Veretnov, deputy chief of the Northern Shipping Company. Understanding the full importance of this trip, he helped to speed up the processing of the vessel in its berth at Bakaritsa: because the freight had not arrived at the port at an even pace, because of the lack of experience in cargo-handling operations on such large freighters and because of a number of other circumstances which were not objective in nature, the loading dragged out. Since the beginning of January only about 10,000 tons of cargo had been taken on board--barely half of the vessel's carrying capacity. G. Veretnov also helped to obtain reserve fuel

for the Arctic trip in Arkhangelsk, without which the "Yuriy Dolgorukiy," which is registered in Murmansk, would have had to lose valuable time making a special trip to the bunker at its home port--locally they absolutely refuse to satisfy the request of "someone else's" vessel. G. Veretnov, perhaps in abuse of his kindness, had to be called on for other problems as well, because often those responsible for a particular area were not responsive enough.

Last winter the ice situation became serious in the Arctic. But this was not the principal reason for delays in delivering cargo extremely necessary to the Norilsk metallurgists and miners. Nor were the crews at fault either.

So, we left the Arkhangelsk Seaport. But even the departure on 31 January should be considered only provisional: after a few hours of following the icebreaker "Kapitan Melekhov" in the incoming channel, the management of the vessel was ordered to report at the so-called Black Tower. Here the idle time lasted almost another 3 days. They first led their own vessels, those from Arkhangelsk, through the channel to the receiving buoy, and thereafter they were led to open water by the Murmansk line icebreaker "Kapitan Sorokin" and the "Kapitan Melekhov" conducted to Arkhangelsk the vessels that had arrived through the ice of the White Sea with the "Kapitan Sorokin." Which is how it happened that the "Yuriy Dolgorukiy" with urgent cargo for the Norilsk Combine, seemed to have been left out of the scheduling. No, we do not have connections here, and the Murmansk sailors smiled cheerlessly.

Of course there is no doubt that all cargoes--general cargo, liquid, timber and grain--are urgent and important. But successful performance of the trip of the "Yuriy Dolgorukiy," which was actually for the first time making an experimental winter Arctic trip with a view to the future, depended on joining together all the links in this most complicated line.

When the icebreaker "Kapitan Melekhov" passed the "Yuriy Dolgorukiy" once again in the channel, its captain Ye. Zubov, understanding how ridiculous the situation was, communicated with the staff of the harbormaster of the port of Arkhangelsk, asking what to do.

"Don't let it worry you, Yevgeniy Alekseyevich, they will survive," was the answer he received.

But even the pilots who replaced one another on board remarked that it would have been better to conduct the "Yuriy Dolgorukiy" first, since the comparatively small Arkhangelsk vessels would have had an easier time going behind it.

"The winter shipping season is at its height. Every year approximately 15 vessels are processed in various docks," said A. Makar'in, senior pilot of the Arkhangelsk Seaport, who was on board at the time. "Many of them are bringing grain and sailing with timber for export. Various cargoes are being sent to the ice docks above the Arctic Circle. You are going to Dudinka. But when there are only three icebreakers, two of which are designed as harbor icebreakers, and one of them belongs to the hydrofacility. As a matter of fact, you see yourself that at present all the leading in the channel is being

done by the "Kapitan Melekhov" alone. So the vessels are piling up and standing idle in the ice.

At this point it has to be said that the shortage of icebreakers, lack of coordination between the actions of different services, the localistic approach, violating the schedule of the vessels, create a strain along the entire Arctic line in whose development so many efforts and resources have been invested. Incidentally, I have heard that now the convoys go even in heavy ice on a schedule accurate practically to the hour. In any case, there are tables with which one can accurately compute the planned travel time for the convoy to the hour if one knows the makeup of the convoy, the type of vessel, the icebreaker, the condition of the ice and the snow cover. And this in the Arctic, in the silent polar night, in the packed hummocky ice. But on the approaches to it, in the hummocks of intradepartmental mismanagement and poor organization many days of valuable time are lost.

... The outgoing transports waited their turn. And a convoy had already formed at the receiving buoy; it had come on the sea side of the ice conducted by the "Kapitan Sorokin." And the crew of the "Kapitan Melekhov," which must be given its due, did everything it could. Often the icebreaker literally carried the vessels, took them on its back, with a short steel towline.

The captain of the "Yuriy Dolgorukiy" decided to make an attempt to try the channel on his own and to break through as far beyond that as possible in order to put an end to the idleness.

The narrow jagged passage was crammed with packed ice, and the 160-meter vessel had difficulty fitting through the tight turns. At one of them the hull became wedged in the channel. The "Yuriy Dolgorukiy," whose engine has a capacity of 11,200 hp, lost way.

After the receiving buoy, not having made connections with the icebreaker "Kapitan Sorokin," which had departed with a convoy, it managed to increase its speed to 8 knots--because of the natural depths, the ice was now the gray-white kind that is easy to pass through.

But far ahead it was already possible to see the hummocky fields, in some places piled one on top of the other, intersected by long ridges. And soon the squeeze began. The miles were hard to make. Sometimes the ship, getting squeezed, would be carried backward by the winds and currents. Then they would stop the engine in order not to burn fuel for nothing. But with the slightest shift of the ice, they again began to make their way forward.

At mealtime the helmsman on watch V. Sapotskiy announced over the ship's radio: it had traveled 20 miles in a day, there were 1,320 miles left to Dudinka.

And the struggle against the silent and cold elements went on for days after that. But the ice held fast. The "Yuriy Dolgorukiy" got stuck in the throat of the White Sea.

And only after 3 days was the icebreaker "Kapitan Sorokin" able to come to us (in passing, while leading another vessel through the ice). It broke up the ice field until the break reached us, there was a small parting of the ice, and our vessel, getting under way, started off after the leader. But time had been lost. The nuclear-powered vessels, not waiting for us, had undertaken to conduct another transport and conducted it to Dudinka.

What could Captain A. Igritskiy do but ask the shipping company for permission to crawl at Murmansk in order not to drift in vain, waiting at the edge of the Arctic ice. He is a businesslike man, and he decided to use this forced idleness in the interests of the effort--he took on additional containers for Dudinka and fuel for the line diesel icebreakers working in the Arctic, and gave the sailors an opportunity to visit their families.

And only on 16 February did the ore carrier and container carrier "Yuriy Dolgorukiy," conducted by the nuclear-powered vessels "Arktika" and "Sibir," enter the Kara Sea, having finally begun its Arctic voyage proper.

The chronicle of this trip, during which the passage from Arkhangelsk to the edge of the ice lasted longer because of various bad connections than the subsequent trip being conducted in the thick polar ice, in the dark of the polar night, shows the weak points in organization of the Arctic winter shipping season.

The heroic expeditions into cold seas, the famous passage of the nuclear-powered vessel "Arktika" to the North Pole, were not ends in themselves. Their strategic task was to develop the Northern Seaway, to make it a reliable and constantly operating main transportation line in order to make not isolated record trips here, but ordinary working trips. And to achieve that it is important that the tactical decisions and actions do not contradict, but in every way promote successful fulfillment of this crucial program.

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CSO: 1829/284

VANINO PORT DEVELOPS OWN CARGO-HANDLING TACKLE

Moscow EKONOMICHESKAYA GAZETA in Russian No 28, Jul 82 p 16

[Article by V. Rostovtsev, chief technologist of the Vanino Commercial Seaport, Khabarovskiy Kray: "Progressive Technology in a Seaport"]

[Text] The large-capacity portal crane turned toward a stack of large-diameter gas pipeline pipe. An unusual grab was suspended from the cables of the crane with spread wings. It came over the stack. In an instant a piece of pipe 11 meters long and weighing 7 tons was moved and stowed in a gondola car. The crane operator works alone, there are no slingers.

A fully mechanized and automated technology is used here for the handling of pipe. The system was worked out on the basis of new load-gripping attachments proposed by the inventors of our Vanino Commercial Seaport and the port of Klaypeda.

Alongside on the docks pipe is being unloaded from the deck of a vessel with the same automatic attachment.

On a neighboring pier packaged timber is being loaded on a vessel. Here the crane is equipped with a semiautomatic grab. There are no longshoremen in the hold of the pallet carrier.

This is a commonplace scene as the handling of cargo is now organized in the port of Vanino. The work force has been enthusiastically involved in equipping its entire operation with up-to-date equipment and introducing various innovations and intensification of the cargo-handling process.

What Has Been Done Already

In recent years the appearance of the port has undergone substantial change. A large portion of the outdated cranes have been retired. Improved technology and new load-gripping attachments have guaranteed an appreciable rise of labor productivity. The share of manual operations in processing vessels and railroad cars has diminished.

We will take a brief tour around the docks where the progressive technology has been incorporated for handling and moving packaged timber. Labor

productivity has doubled. The inputs of labor in handling the annual volume of 350,000 tons of through packaged timber have dropped by 30,000 quota-hours. The saving amounts to the labor of 15 longshoremen.

Nor have the problems of mechanizing auxiliary operations been ignored. For instance, all the cranes [one line of text omitted in copying--translator's note] ... with connections--toggles. Load-gripping attachments of any type can be replaced in 2 or 3 minutes. Consequently, the previous time allowances for replacing clamshell grabs, lift magnets, and automatic grabs have been tightened. The saving amounts to 15,000 quota-hours.

On the grounds of the port one can see gasoline lift trucks equipped with cradles created by our innovators. The lifting device is used as an ordinary fork in moving crates and piece cargo and as a cradle for cleaning up trash and loading it into trucks and for stacking short-length timber.

The attachment for coiling wire, proposed by the innovator V. Gvozdenko, is in great demand among the longshoremen. A number of other attachments have been developed to mechanize auxiliary and repair work.

Every year some 200 innovative proposals and inventions are applied in our port.

The work to improve cargo-handling operations, to mechanize and automate them, has been concentrated in the technology department. Its staff includes a group of designers. That is why changes can be made in the design documentation responsively and without delays and new attachments developed quickly.

The drawings do not lie around--a shop for load-gripping attachments subordinate to the technology department has been equipped in the port's machine shops. The costs of maintaining the shop are charged to the cargo area. Those who have shown themselves to be true enthusiasts of technical progress include foreman V. Rostovetskiy, work team leader A. Kamzarakov, the workers A. Petrov, S. Vlasov, V. Dodonov, A. Brazhnikov, N. Gerasimov and others. In the cargo areas there are sections for technological gear.

Not Stopping at What Has Been Achieved

We should note that the information service contributes to development of the creative activity of the specialists and worker-innovators. It furnishes them extensive material on technical innovations in domestic and also foreign seaports.

The experience which has been gained, the organizational forms which have been worked out, and the strengthening of the physical plant and equipment (the shop for load-gripping attachments and the technological gear sections) have created the prerequisites for extensive application of full mechanization and automation of all operations. The plan for the period covered by the 11th Five-Year Plan calls for performing measures to make it possible to economize the labor of 80 longshoremen. The economic benefit over the 5 years will amount to 1.5 million rubles.

The comprehensive plan is being carried out. For instance, last year we succeeded in completely eliminating the participation of longshoremen as slingers in handling pipe in the following flowcharts: deck--storage (gondola car, flatcar); storage--crane--gondola car; storage area--storage area.

In 1982 the technology for handling containers was fully mechanized using grouped semiautomatic crane grabs. As a result labor productivity rose 30-50 percent. It is becoming unnecessary to use pallets under containers, the use of storage area is being improved, and the processing of vessels and railroad cars is speeding up.

We are anxious to borrow inventions and innovative proposals from other seaports and riverports. At the same time we are ready to share our own innovations. For instance, in 1980 we responded to requests from other places in sending out 49 sets of technical documentation, last year 85, and in the first quarter of 1982 we sent out 29 sets. The technology developed in Vanino for through timber shipments with the packages laid crossways on the deck has been studied and then introduced by port workers in Vostochnyy. The blueprints of the crane grabs for large-diameter pipe have been delivered to the ports of Vladivostok, Leningrad and Klaypeda.

Not so long ago we asked the administration for operation of the fleet and seaports of the Ministry of Maritime Fleet to appoint a commission for full-scale acceptance of our grabs and attachments. Then a proposal was made in one of the central design offices that the technical documentation for them to be centrally manufactured at plants in the sector. But we did not get a response. And it is a pity. After all, in many respects it is more advantageous for production to be centralized in that way. Just as it would be desirable to organize delivery of prong-type grabs and UUK-3 and UUK-5 gasoline lift trucks, crane toggles and certain other attachments.

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CSO: 1829/274

RIVER, SEA SHIPPING SUPPLIES GAS FIELDS

Pipe Goes Sea Route

Moscow VODNYY TRANSPORT in Russian 20 Jul 82 p 1

[Article: "To the Tyumen Gas Field Workers"

[Text] The shipping season in the Ob-Irtysh Basin has entered a decisive stage--delivery of cargo to the extreme north of that part of Tyumenskaya Oblast above the Arctic Circle has begun. In Obskaya Guba, not far from the settlement Novyy Port, transshipment of large-diameter pipe has been organized for the Siberian trunk gas pipeline. The first lot of pipe has been delivered here by the oceangoing freighters "Aleksandr Suvorov," "Dmitriy Donskoy," "Pavel Korchagin," and others. The crew of the icebreaker "Kapitan Nikolayev" cleared the way for these vessels in the thick ice.

In the roads of Novyy Port the baton is taken up from the mariners by the rivermen of the Irtysh Shipping Company. They transship the pipe to barges and conduct convoys to Nadym.

"The importance of these shipments," explained N. Markichev, chief of the service for cargo and fleet traffic of the Irtysh Shipping Company, "is very great. The route previously taken by such cargo was long and problematical. First the pipe was delivered by sea to the ports on the Baltic, and it was transshipped to rail, and then carried several thousand kilometers to Omsk and Tobolsk. There there was a second transshipment to river vessels. And again they had to cover about 3,000 km by water for the freight to reach the lower reaches of the Ob, and then through the Obskaya Guba to the Nadym River.

"Now the route traveled by the gas pipe has become far shorter and simpler. From Hamburg, Bremen and other seaports the vessels of the Murmansk Maritime Shipping Company travel the Northern Sea Route to Obskaya Guba and Novyy Port. There the cargo is taken over by the rivermen."

During the last shipping season 150,000 tons of large-diameter pipe were delivered to the Tyumen Gas Field workers by sea. Now the Yamalskiy gas pipeline construction workers will receive more than 200,000 tons of pipe from the mariners and rivermen for the Urengoy--Uzhgorod export gas pipeline.

A new cargo area has been created in the port of Salekhard in Obskaya Guba to handle this crucial task.

Cargo Reaches Nadym

Moscow SOVETSKAYA ROSSIYA in Russian 15 Jun 82 p 1

[Article by V. Kamitov: "Arctic Navigation"]

[Text] The first convoy of vessels from the southern ports of Tyumenskaya Oblast has reached Nadym. They have delivered building materials, gas field equipment, petroleum products and prefabricated housing for enterprises in the gas field that is being developed. During this shipping season the riverport just below the Arctic Circle is processing more than 1.5 million tons of cargo.

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CSO: 1829/282

OCEAN AND RIVER

VESSEL REPAIR FOR GRAIN SHIPMENT URGED

Moscow VODNYY TRANSPORT in Russian 20 Jul 82 p 1

[Editorial: "The Harvest en Route"]

[Text] The motor vessel ST-764 departed from the Volga riverport Bakhtemir for Leningrad. In its holds were 258 tons of Astrakhan tomatoes. This trip was opening up the 1982 "harvest" shipping season and marked the beginning of a new and extremely crucial stage of operation of the rivermen.

The present harvest campaign is a special one on the rivers. Like all the Soviet people, the rivermen are living their lives and doing their work under the impact of the May (1982) Plenum of the CPSU Central Committee, which adopted the country's Food Program. The labor force of the river fleet is full of determination to make its contribution to fulfillment of that program. This desire is indicated by the open letter published in our newspaper from the rivermen, in which they responded to the appeal of the vegetablegrowers on the Lower Volga to commit themselves to delivering without loss everything consigned for river transport, quickly and without losses.

The importance of this task is determined by the fact that the share of river transport is almost 70 percent of all the tomatoes and a sizable portion of the watermelons from the lower reaches of the Volga. The shipping companies have a fleet of adequate size to handle the volume of shipments of melons. It is only necessary to operate that fleet at a high level, achieving unconditional fulfillment of the plan standards in cargo-handling operations and strictly observing the established shipping schedule.

The problems of faster delivery and preservation of the cargo representing the harvest will be successfully solved where concern is paid to introducing progressive technology and above all to containerization of fruits and vegetables. In the current year the collegium of MRF [Ministry of River Fleet] has for the first time set the shipping companies and corresponding administrations of the ministry the task of carrying the entire planned volume of watermelons in containers. To that end careful thought should be paid even now to all the aspects of returning the empty containers and of providing the necessary number of cranes to all the loading points. It is very important to have interaction and smooth coordination with procurement and trading organizations so that concern about preservation and faster delivery of fruits and vegetables is shown in all sections of the transportation conveyor.

The experience of the transportation workers in Leningrad has extremely great importance to achieving uninterrupted delivery of farm products. Every port involved in this work must have an agreement for labor cooperation with related organizations so that efforts are coordinated in accordance with continuous overall schedule-plans. The watermen, the procurement people, the truckers, and the railroad people should unite their efforts everywhere in the struggle for prompt and quality delivery of grain and vegetables.

In preparing for shipment of the harvest the rivermen, as in past years, have set aside a fleet numbering hundreds of motor vessels and barges for this purpose. And the success of the harvest shipping season will depend above all on the technical condition of that fleet. A ship which is to carry grain or vegetables must meet all the high requirements which are dictated by concern about preservation of a valuable product. Unfortunately these circumstances are not always taken into account in the shipping companies, a formal approach is sometimes taken in evaluating the condition of the fleet. For example, the "grain fleet" of the Volga United Shipping Company includes the motor vessel "Kanash" of the Gorodets SRMZ [Ship and Machine Repair Yard]. But, as an inspection has proven, the vessel has defects which clearly eliminate the possibility of its being used for carrying grain. This is a very disturbing case. The readiness of every vessel has to be checked time and time again, and all the technical defects corrected in the days which remain.

As experience of past years demonstrates, sometimes the shipping companies allow substantial losses of the carrying capability of the harvest tonnage because of various technical defects. Sometimes days of valuable shipping time are lost because of some insignificant breakdown. If these losses are to be avoided, it has been proposed to the shipping companies in the current year that in yards, shore production facilities and ports located near loading and unloading points they organize specialized work teams for repairing vessels to meet the class 1 requirement (po pervomu trebovaniyu).

Any day now the first vessels will be arriving for loading at grain-receiving points and elevators. The crews of river vessels have gained quite a bit of experience in the carrying of grain. True heroes of the grain harvest and well-known masters at carrying the harvest have distinguished themselves. Among them is B. Tsvetkov, captain of the Don motor vessel "Neva." Every year his crew assumes high obligations to deliver grain and performs them with honor. In the present shipping season the crew of the motor vessel "Neva" has given its word to carry 40,000 tons of grain without losses. The basis of this crew's success is the faultless technical condition of the vessel, close interaction and businesslike friendship with the collectives of grain-receiving points and ports.

It is well known that the pace of grain shipments and smoothness of operation of the grain lines will depend in large part on procurement people. At the docks of the RSFSR Ministry of Procurements much has been done to organize reception of the new harvest. But at the same time there are still shortcomings there which have cropped up year after year. The outdated and small-capacity equipment of most of the grain docks on the Volga and Don do not afford productive use of the modern fleet. Reconstruction and construction of new docks

have been delayed unjustifiably. At Kostroma, for example, the dock of Grain-Receiving Depot No 23 was put into operation with a delay of several years. But it has not been brought up to its design capacity--instead of 2,000 tons of grain a day it handles only half of that. The rivermen rightfully hope that the procurement people will put their house in order and will do everything so that the main grain road--the Volga--is used at full capacity for carrying the harvest.

The harvest is en route! The flow of vessels is increasing every day now, and their crews, taking the baton from the growers, will deliver the valuable cargo from the southern regions to the country's industrial centers. It is the duty and obligation of workers in the river fleet to give the "green light" to the harvest, to see that daily and 10-day shipping schedules are met promptly, without the slightest delay to deliver everything that is consigned to river vessels. This will be the rivermen's practical contribution to fulfilling the country's Food Program.

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CSO: 1829/274

NEW VEGETABLE CARRIER DESIGN DESCRIBED

Leningrad LENINGRADSKAYA PRAVDA in Russian 7 Jun 82 p 1

[Article by Ya. Yartsev: "A Diesel Motor Vessel for Vegetables"]

[Text] This new diesel motor vessel is still in the model stage, though it has already made quite a few "trips" in basins during model tests. A great deal of work has been invested in building the ship on the scale of 1:100 by the patternmakers V. A. Kiselev, R. B. Borodetskiy, A. N. Nekrasov, V. A. Yefishchenko under the supervision of V. P. Vorontsov, chief designer of the project. And now the people at the Plant imeni 40-ya Godovshchina Oktyabrya of the Volga River Shipping Company are preparing to undertake construction of the first prototype of the diesel, which was specifically designed in Leningrad to carry vegetables. The staff of the Central Technical Design Bureau (TsTKB) of the USSR Ministry of River Fleet recently passed on the working drawings and manufacturing instructions to the Volga shipbuilders.

The country's river fleet is large, but there is a shortage of specialized vessels. This is felt especially at the time when the harvest is gathered. It is difficult to speedily deliver vegetables, fruits and watermelons which are ripened in southern regions to consumers without loss. Motor vessels in the "Volgo-Balt" series, for example, so well known to many people in Leningrad, cannot perform this task: their capacity for carrying vegetables is small, and the conditions under which they are carried are not such that they can ensure preservation of perishable cargo.

It seems that the staff of developers had to solve quite a few technically complicated and sometimes even mutually exclusive problems one after the other in creating the new motor vessel. How to protect the vegetables from spoilage and to do without refrigeration equipment; together with specialists of the Leningrad Refrigeration Institute and the administration Glavlenplodoovoshchprom [Leningrad City Administration for the Fruit and Vegetable Industry], engineers of the TsTKB sought an optimum solution to the problem. The designers G. S. Nikitin, B. D. Vyatkin, and A. B. Belkin proposed that tomatoes, say, be loaded in special containers and that the hold where they would be stowed in four tiers would have forced ventilation.

In order to speed up loading and unloading it was decided that the hatches have sliding covers of the telescopic type. Thus the cargo crane can place the load at any point in the hold.

One other feature of the motor vessel is that the entire living space, which will accommodate a crew of 10, will be located in the bow, and the engineroom in the stern. The systems for controlling the power plant have, of course, become more complicated. But this is more than made up for by the gain from this configuration of the ship.

When the living quarters are located in the stern, they have to be soundproofed and protected against vibration created by the engines located nearby. The costs of solving this problem alone go to 80 percent of the cost of the entire ship. That is how selection of the original new solution, the fortunate configuration of the engineroom and the equipping of the living space (this part of the work was done by M. P. Duman, M. T. Nikitin and V. A. Finogenov) have substantially reduced the motor vessel's construction costs.

"Although we were designing this vessel specifically to carry vegetables," says M. G. Avrukh, chief engineer of the project, "we decided to make provision for possible shipments of such cargoes as timber, grain and equipment. Thus motor vessels of this type will be used during the entire shipping season, and not just during the harvest season. According to our calculations, delivery of watermelons, for example, from Astrakhan to Leningrad by river in 7 days will not deteriorate the quality of the cargo in view of the storage conditions on the vessel. And one trip of such a vessel means thousands of tons of watermelons, or 600 tons of tomatoes delivered directly to the table of city dwellers. The motor vessel will find application on small rivers, and it can also be used even in areas of coastwise maritime shipping. In short, in creating the specialized vessel we have at the same time tried to expand the sphere of its application. This required solving a number of serious technical problems related to increasing the vessel's maneuverability and reliability, and we enlisted creative cooperation from the staffs of the Leningrad Institute of Water Transport, the Central Scientific Research Institute imeni Krylov, and institutes of the USSR Academy of Sciences."

It needs to be added to these words of the project's chief engineer that the new devlopment of the people from Leningrad is directly related to the measures outlined by the Food Program which was discussed at the May Plenum of the CPSU Central Committee.

The new motor vessel offers labor productivity twice as high as those vessels which the country's river fleet now possesses, and shipping costs on it will be 50 percent lower.

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CSO: 1829/284

RIVER VEGETABLE CARRIER OF NEW SERIES UNDER CONSTRUCTION

Moscow VODNYY TRANSPORT in Russian 26 Jun 82 p 4

[Article by B. Ryazantsev, Rybinsk: "Dry-Cargo Freighter for Vegetables"]

> [Text] RSFSR Ministry of Shipbuilding Industry and Ministry of River Fleet are to build 90 river vegetable carriers in the 1983-1990 period ... (Excerpt from the USSR Food Program for the Period Up to the Year 1990)

The narrow perforated tape moves unhurriedly through the calculating device. Obedient to the holes in the paper, the plasma stinger cuts the steel sheet, never wandering from the given dimensions, leaving no extra material and no burr. At this point it is difficult for a computer to surprise anyone. Even if it computes the parameters of a future vegetable-carrying vessel upon instruction from the engineers, and an intelligent robot, governed by its program, carefully disposes of the metal. But electronics and automation are only man's aids in transforming the unique design developed by specialists of the "Vympel'" TsKB [Central Design Office].

"At present there are no such vessels in the world," says V. Milekhin, director of the Rybinsk Shipyard imeni Volodarskiy. "The decision to build a series of dry-cargo motor vessels to carry vegetables and packaged cargo was made after the 26th CPSU Congress during preparation of the Food Program. The designers carried out their assignment. The result of their exploration is a vessel about which one can use the word 'first' concerning many of its features."

For the first time a computer participated in developing the elements of a motor vessel according to the basic elements defined by the designers. And because the vessel is for the first time being built according to the most up-to-date system--a mathematical model. For the first time a combination general-purpose and specialized dry-cargo vessel has been built with two air-conditioning systems. One is for the comfort of the crew. The other is the technical system which has a broad range of regulation depending on the type of cargo in the two holds. Every vegetable and every fruit has its own conditions.

The rivermen are waiting for this motor vessel. After all, up to now there have been no specialized vessels for this kind of cargo. It has not been uncommon, for example, for vessels in the Volga-Don series to be loaded with tomatoes. And finally, it is not easy to quickly build the hulls of a vessel carrying 5,000 tons. There is no hoisting equipment on the dock, or the procurement people have not delivered the necessary quantity of produce. And sometimes they bring it and load it--and the tomatoes in the lower crates lose their quality.

In addition, the large vessel cannot go everywhere in the delta of the Volga. Whereas the overall dimensions of the vegetable carrier allow it to go in meandering and shallow watercourses. Its draft is only between 1.8 and 2.5 meters.

The dry-cargo vessel's carrying capacity is indicated by two numbers: 600/1,300. The larger number signifies the maximum load. The smaller that the vessel retains its stability characteristics when the holds are filled with a low-density cargo. "Soft-type" vegetables and fruit will be carried only in containers. This preserves their quality and will reduce cargo-handling time. The designers have also given the vegetable carrier a suitable speed--about 20 km/hr. Under the given conditions for vegetables this is quite enough for them to reach the consumer in their best condition.

In short, many things in the vessel are unconventional and unusual at first glance. For example, the wheelhouse and living quarters are located in the bow of the vessel. This has improved vision and other conditions of navigation; and when the crew is resting it will be free of the vibration that is unavoidable when the vessel is under way.

Every worker in the yard--from the watchman to the representative of the management has been caught up in the atmosphere of heightened activity generated by the most important order of the Food Program.

"We have managed to create an atmosphere of enthusiastic industry in all the yard's subdivisions," Valentin Borisovich continues. "The most up-to-date project planning and work methods, first-class equipment and the great vigor and vitality of the entire work force made it possible for us to lay the hull of the motor vessel in just 3 months. The first plate was cut on 20 December of last year, and this March they already began to assemble the vessel."

And now the pace is continuing to be stepped up. The enterprise's council of work-team leaders has appealed to the collective not only to make a crash effort under the slogan "A 'Green Light' for the First Vegetable Carrier," but also to meet high standards of quality in delivering it ahead of schedule to the rivermen. According to the plan, this is to be done next June. But it will take place a month earlier. By the end of this year the vegetable carrier is to be three-fourths completed, and reconstruction will begin at the plant on 1 January of next year without halting production.

At present the motor vessel is being put together in parts: the bow and midships sections are being put together in the shop, and the stern is to be welded outdoors.

"The vegetable carrier is the initial order," says A. Zaytsev, work team leader of one of the best teams of the plate shop. "And that is why we cannot lose our reputation. But how can bad work be done by such a skilled workman as Boris Petrovich Yablokov, who is capable of doing any operation--welding, fusing, marking out, gas cutting. And we have many such people in the shop, the overwhelming majority."

"We understand quite well," adds Yu. Terekhov, leader of a work team of shipfitters, "that more vegetables, fruit and berries have to be delivered to the country's northern regions. Our 'Volodarets' will help to make people's table more abundant...."

There are in fact many people in the yard who refer to the new motor vessel as the "Volodarets." After the name of the enterprise and the settlement which is the home of warships.

"There was an obvious justification for the leadership to support the desire of the workers in calling it the 'Volodarets,'" confirmed L. Smirnov, chief builder in the yard and on the first of the dry-cargo and vegetable carriers. "And there are a number of reasons for this. We began to put the series in production, the word reflected in the Food Program was specifically assigned to us. The keel of the motor vessel was laid in honor of the 60th anniversary of formation of the USSR. Finally, it is very important to the work force that the yard will this year celebrate its 75th year. And the name of the enterprise on the side of the ship is the best incentive for our work force to make a selfless crash effort...."

The three parts--stern, midships and bow--will become a single entire hull as early as August. The bed for the main engines, which are en route from the GDR, has already been installed in the stern. One can suppose both from the fact that work is bustling in the shops and from the mood of the people that the combined dry-cargo and vegetable carrier will be delivered by the date promised. And perhaps even earlier.

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BRIEFS

NEW FISHING VESSELS--Fishermen of the Far East kolkhoz "Ogni" have received another trawler, the "Sterlyad'," which has been delivered ahead of schedule at the Volgograd Shipyard. It has up-to-date equipment and will help the kolkhoz members to take a greater bounty of the sea and ocean. The "Sterlyad'" will travel by its own power to its destination. It will have to travel through several seas to reach it. In recent years the Volgograd shipbuilders have delivered several up-to-date vessels to the fishermen of the "Ogni" Kolkhoz. The new trawler "XIX S"yezd Komsomola" has also departed for the Far East. And in just the last 10 years the Far East fishermen have received dozens of up-to-date trawlers from the hero city. [By Yu. Kas'yanov, Volgograd] [Text] [Moscow IZVESTIYA in Russian 5 Jul 82 p 2] 7045

NEW DOCK AT NAKHODKA--Construction of the new dock in the eastern port has been completed in Nakhodka. The fitters have started to install the cargo-handling complexes. They will make it possible to completely automate the work of the longshoremen. Loose cargo will be piped directly into railroad cars. Every dock in the port has its own specialty. One may handle coal, another timber, wood chips. The new dock also has its "occupation"--here they will be processing vessels carrying grain, sand and cement. Complete automation of loading and unloading operations will make it possible to process a vessel in 10 to 15 hours on the average. Three large-capacity vessels will be able to tie up at the dock simultaneously. Opening of the new dock increases the port's traffic capacity by almost 3 million tons of cargo per year. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 24 Jun 82 p 1] 7045

NEW TANKER--Finishing work is being done on the new tanker "Marshal Vasilevskiy" at the Kerch "Zaliv" Shipyard imeni B. Butoma. The vessel's deck length is 242.8 meters, beam more than 32 meters, hull height 18 meters, water displacement 84,500 tons. The capacity of the main engine is 16,800 hp. [Excerpt] [Moscow EKONOMICHESKAYA GAZETA in Russian No 24, Jun 82 p 5] 7045

NUCLEAR-POWERED VESSEL PROGRESS--A nuclear-powered giant--the nuclear-powered vessel "Rossiya"--is under construction at the Baltic Shipyard in Leningrad. Orders for this vessel have been filled by 450 of the country's enterprises. Continuing the shock watch in honor of the 60th anniversary of formation of the USSR, work teams of ship assemblers are stepping up the pace in installing sections of the hull of the nuclear-powered vessel. Its construction has been assigned to the shipyard's best specialists. The competition is being led by

a youth team of ship assemblers headed by party member V. Orlov. The team is regularly staying ahead of the schedule of operations. And in one of the shops of the yard the main propeller shaft has already begun to be machined. This is being done by party member V. Petrov, a veteran at the enterprise. The photograph shows participants in building the nuclear-powered vessel "Rossiya"--A. Ekster, master inspector of the technical inspection department, G. Marikov, section chief, and V. Smirnov, welding foreman. [Text] [Moscow PRAVDA in Russian 12 Jun 82 p 1] 7045

ARCTIC SHIPPING--The Aleksandr Nevskiy is the first Murmansk vessel this year to have crossed the Arctic from West to East and back. It delivered Finnish prefabricated houses to Pevek for geologists. More than 30 Murmansk ships have now reached the Eastern Arctic, delivering economic freight including equipment, pipes and food. But the ice situation worsened tangibly in mid-August, and ships are being convoyed by a group of icebreakers headed by the atomic-powered Lenin and Arktika. [LD070316 Moscow Maritime Service in Russian 1200 GMT 3 Sep 82]

CSO: 1820/326

MISCELLANEOUS

EXPERIMENTAL INDUSTRIAL PIPELINE SYSTEMS SURVEYED

Moscow TEKHNIKA I VOORUZHENIYE in Russian No 7, Jul 82 pp 4-5

[Article by A. Gus'kov, director of VNIIPItransprogress [All-Union Scientific Research and Project Planning and Design Institute for Pipeline Container Systems], candidate of engineering sciences, and V. Zaytsev, scientific secretary of VNIIPItransprogress, candidate of engineering sciences: "Specialized New Ways of Moving Materials"]

> [Text] To speed up introduction of continuous and specialized new ways of moving materials--conveyor, pneumatic container, hydraulic and other systems ... (From the Basic Directions for the Economic and Social Development of the USSR Over the Period of 1981-1985 and Up to the Year 1990)

Today it is already difficult to imagine the USSR transportation system without such a comparatively young, but very rapidly developing form of transport as main pipeline transportation and the use of pipelines to move materials within industry. Until recently the pipelines used in transportation and the movement of materials were intended mainly for carrying petroleum, gas and various petroleum products. But as the fuel and power base has shifted to the country's northern and eastern regions, it has become necessary to deliver solid fuel from the place where it is mined to industrial regions. Pipeline transport will make it possible to solve this problem effectively.

The problem of organizing the ongoing movement of various materials, mainly loose materials, over short distances (up to 50 km) is taking on great importance in the national economy. As calculations have shown, it is not economical to use railroads or trucks for these purposes. Specialists have proposed that such materials be moved in special containers within pipes. This type of transport will be especially efficient in remote, inaccessible and sparsely settled regions (where there are no railroads and highways), and also in regions where climatic conditions are problematical. The principal advantages (over conventional hauling by trucks and rail) are the continuity of the transport process, the possibility of automating it, the lower cost, the lower operating cost, reduced loss of the material, and lower costs in loading and unloading.

Efforts are being vigorously pursued in the Soviet Union to create short-run pneumatic pipeline systems for the movement of materials. Such a system consists of a pipeline with containers inside. Air is used as the carrying medium. The movement of single containers or container groups is accomplished by air blast units. At the present time there are two such pneumatic pipelines in operation. One of them (TPK-1) has been built in the city of Dzerzhinsk in Gorkovskaya Oblast. This is a single-tube line whose operation is periodic (shuttle) with a compressor-vacuum pattern of operation. The pneumatic pipeline is designed for two strings (consisting of 8 containers each) and has a load capacity of 56 tons. By forcing air into the pipeline, they move the loaded strings of containers, and by creating a vacuum, they return the empty ones. The length of the pipeline is 7 km, the diameter of the pipe 1,220 mm, and the annual output is 370,000 tons.

A new principle for inserting and removing the containers from the pipeline without lock in the continuously operating pneumatic pipeline (TPK-3), a full-scale pilot system built at the Sychevo Mining and Ore-Dressing Combine, is used. The containers are braked in an unregulated pneumatic buffer. The process of controlling the pneumatic pipeline has been altogether automated. The diameter of the pipeline is 1,220 mm, its length is 3 km, and its annual output is 4 million tons.

At the present time three types of container pneumatic pipeline systems are being developed for industrial and agricultural use. The former includes industrial pneumatic shuttle pipeline systems. They envisage one tube within which the containers move (one or two strings). The maximum output of such a system is 1 million tons per year and the length 10 km. Industrial container systems of the second type are double-tube (ring systems). Their maximum output is 5 million tons per year. These systems are designed for moving loads over a distance under 20 km. The third type includes flexible pneumatic pipelines designed for movement of materials in agriculture. Their output goes as high as 50 tons per hour, and they can move materials up to 5 km.

The container systems we have discussed above belong to transport systems whose operation is discrete. In our country efforts are being made to create continuous transport systems--conveyor trains, hydrotransport systems and pipeline systems with a continuous flow of containers.

We should note that continuously operating transport systems are far more efficient than discrete pneumatic pipeline systems. For instance, the economic efficiency of conveyor trains has been proven in practice. Compared to truck and rail trains, they make it possible to double labor productivity, to reduce calculated unit costs to 6-8 kopecks per cubic meter of load transported.

The idea of creating conveyor trains is not in itself a new one. Hundreds of scientists, engineers, designers and staff members of entire institutes have worked and are working to put it in practice. A series of belt conveyors is set up which are designed for carrying loose, lump and piece materials over a distance on the order of 10-12 km. Such conveyors consist of separate sections. The driving and load-carrying element is the belt, which moves over stationary roller supports. Depending on the type of roller support, the belt

may be flat or trough-shaped. The loose material is loaded on the belt by a guiding chute or hopper, and unloaded by a drum at the tail end or by means of a plow scraper. A conveyor of this type moves only in a straight line. Conveyor trains can alter the direction of movement in the horizontal plane (describe arcs, move at an angle). They constitute a continuous chain of small-wheeled trucks moving on rails.

One of the key problems in developing conveyor trains is to create a sufficiently powerful and reliable power unit. Specialists of VNIIPItransprogress have proposed that a linear electric loader and linear turbine engine be used as power units.

When a linear asynchronous motor is used to drive the system, along the route (at a distance somewhat less than the length of the train) sections of the windings of the electric motor's stator, "which has been expanded to a line," are inserted between the rails. Along the route are traction stations equipped with guiding apparatus and pumps for feeding liquid. At the present time experimental models of such trains have been created; they are being used in working out the design of the cars.

In the city of Ramenskoye in Moscow Oblast a conveyor system 2.5 km long with a linear turbine engine is being built to carry sand from a pit. Conveyor trains 500 meters long will move at a speed of about 20 km/hr. The second such system (it is intended for feeding earth to an earth dam) will be built in Georgian SSR.

In TPKS [pipeline container-flow systems] the material is placed in containers, which are installed inside the pipeline and are joined together in a continuous container chain. It moves by means of stationary electromagnetic or magnetomechanical motors located every 2-3 km along the route. Loading and unloading operations are performed "on the fly," at the container chain's nominal rate of movement. The system's control is automatic. Polymer materials have been used in manufacturing the containers, the running gear and the pipe itself. The diameter of the pipeline is comparatively small, on the order of 300 mm. The traffic capacity of the TPKS is high, up to 5 million tons per year. A very important virtue of this system is the possibility of creating a mobile version which could be quickly dismantled, thus making it possible to use it in moving various building materials (sand, gravel, lime, cement) as well as for agricultural products (grain, mixed feeds, and so on).

An experimental prototype of the container-flow system, intended for carrying mixed feeds, has been created on the testing grounds of VNIIPItransprogress. A similar system (given the code name MTPKS-6) was recently built at the Bolshevskiy Mixed Feed Plant. It replaced scraper conveyors which consume a great deal of power and metal. At one of the enterprises in the city of Tbilisi a container-flow system (PKS) with magnetomechanical drive, which will be used for movement of piece loads within the plant, has been assembled.

At a number of agricultural enterprises in Chelyabinskaya Oblast creation of PKS has begun for moving grain and grain products and for distributing feeds at large livestock-raising complexes.

Today hydrotransport of coal is being developed both in our country and abroad. The coal is ground up at the pithead into particles no larger than 2.5 mm, mixed with water (approximately in the proportion 1:1). The water-coal mixture is pumped at a pressure of 70-100 atmospheres by pumps at an electric power station, where the coal is burned in the boilers after partial removal of the water.

In 1980 an engineering design was developed for a unique full-scale pilot coal pipeline between Belovo and Novosibirsk, which is 250 km. About 3 million tons of coal would be pumped along a pipe 327 mm in diameter from the Inskaya Mine. Construction of this complex is the first step in creating a large pipeline system through which Kuznetsk coal would be supplied to power stations of cities in Siberia, the Urals and the Volga Valley.

Pipeline transportation is also being applied in moving concentrated ores of ferrous and nonferrous metals and the products of the chemical industry. For instance, at the Norilsk Mining and Metallurgical Combine they have begun to build a pulp line for pumping copper, pyrrhotite and copper-nickel concentrates. In 1979 construction was begun on a hydrotransport system for pumping concentrated iron ore at the electrometallurgical combine in the city Staryy Oskol. Specialists have set themselves the task over the period from 1981 to 1987 of creating and putting into pilot operation a pipeline from Krivoy Rog (Inguletskiy Mining and Ore-Dressing Combine) to the Donbass (Yasinovatskiy Sintering Factory) for hydrotransport of concentrated iron ore.

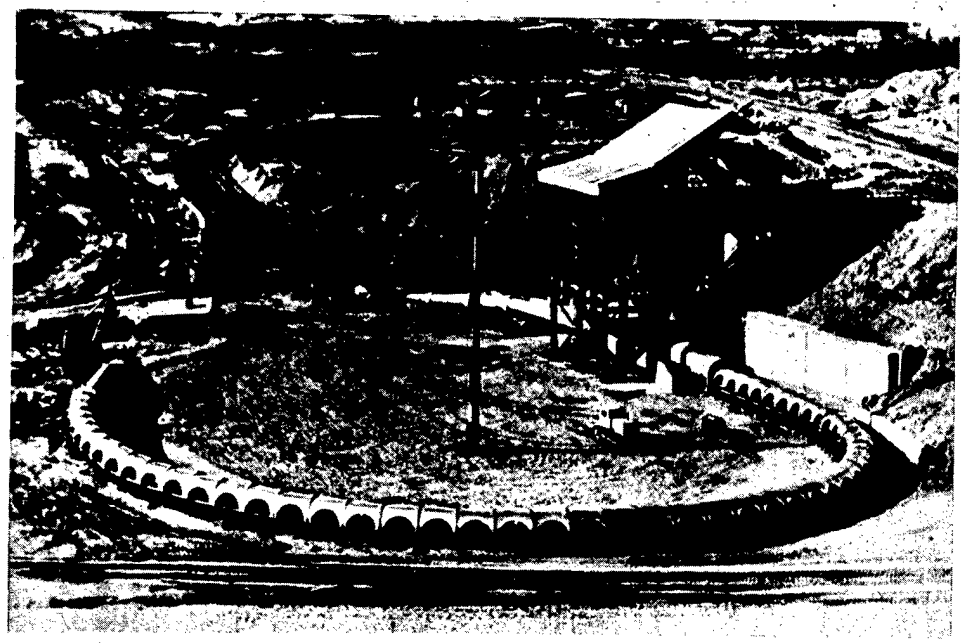
An important problem related to development of hydraulic pipeline transport is creating effective pulp lines for pumping highly concentrated waste from enrichment of ores in ferrous and nonferrous metallurgy and in the chemical mining industry. Introduction of hydrotransport of highly concentrated flows of "tailings" (after compaction) reduces to between one-third and one-fourth the consumption of pipe 1,000-1,200 meters in diameter and cuts electric power consumption approximately in half.

It must be said that pipeline transport of ore concentrates of ferrous and nonferrous metals and of products of the chemical industry fits entirely into the technology for processing these materials. There is no need to create any sort of additional complicated system to prepare the material for transport or for its subsequent use.

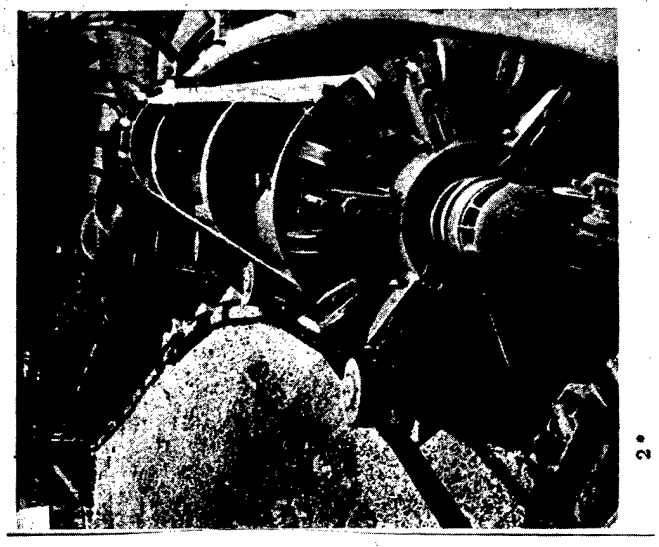
A very important economic and social problem is the problem of creating fundamentally new high-speed transportation equipment for municipal, suburban and intercity passenger travel. In this field the following tasks have been set: to create for cities transportation equipment which would make it possible to move up to 30,000 passengers per hour (average speed should be 60-100 km/hr, and maximum speed 160 km/hr); for suburban transportation--transport designed for a passenger flow up to 20,000 passengers per hour (average speed 100-200 km/hr, maximum speed 250 km/hr); and for intercity travel--transport with a maximum speed of 500 km/hr (average speed 350-400 km/hr).

We will note in conclusion that the volume of traffic carried by rail and highway transportation would be substantially reduced, energy costs reduced,

and a great deal of manpower made available by carrying out the comprehensive program for introduction of new forms of transportation and new ways of moving materials in the various sectors of the economy.



TPK-3 continuous pneumatic pipeline. General view of the loading complex.



Cars of the system in an open section.

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MISCELLANEOUS

IMPORT, EXPORT DELIVERIES DELAYED IN AUGUST

Moscow VODNYY TRANSPORT in Russian 11 Sep 82 p 1

[Article: "Improving the Coordination of Actions"]

[Text] For the collectives at transport centers, August proved to be complicated. Railroad workers, river men, and motor-vehicle personnel have been working with a large amount of strain, handling shipments of this year's harvest. That could not fail to have an effect upon the work at the transport centers. Smaller amounts of imported foodstuff cargoes entered the ports as compared with the first half-year and with July. There was also a reduction, as compared with the plan, in the volumes of shipping export cargoes to the ports. One could feel the effect of the shortcomings in the work of the foreign-trade associations, certain exporter enterprises, and the fact that the railroads had failed to provide empty freight cars for the loading of produce for export. At certain transport centers -- Krasnovodsk, Makhachkala, Magadan, Tiksi, Korsakov -- the planned volumes of coastal cargoes were not submitted for shipment.

The results of the work in August indicated that wherever the collectives of workers in related occupations are working persistently and with initiative for the plan starting in the first days of month and, under the complicated operational conditions, do not disregard the smallest opportunties, success invariably follows. Most of the port collectives coped with the plan for loading and unloading operations in August. In the course of the month the collectives that worked persistently were: Onega, Vyborg, Kalinin, Leningrad, Tallinn, Izmail, Berdyansk, Zhdanov, Ilichevsk, Kherson, Novosibirsk, Tuapse, Batumi, Eastern, Nakhodka, Petropavlovsk, Nikolayevsk-na-Amure, Kholm, and certain others.

At the same time, at many transport centers one noted disruptions in the work. For example, the workers at the Arkhangelsk port fulfilled by only 84 percent the indicator for the reloading of coastal cargo, an indicator that is very important during the period of the Arctic navigation season.

August is the decisive month for shipping commodities to points in the Arctic and the Far North. The port workers provided for their shipment without allowing any large accumulation. As a result of intensive work, conditions were created for completing the shipment of Arctic cargoes from the western direction during the first ten-day period of September and from the eastern direction by the middle of the month.

In August the railroads undersupplied 20 percent of the planned quantity of freight cars with exported freight. Under conditions of the acute shortage of rolling stock, the factor that takes on special importance is its most rapid handling. It must be said that, thanks to the well-coordinated work of the workers in related occupations, 99.3 percent of the freight cars were used in the normative time periods. Transport workers who prevented any delay in the unloading were those at the Murmansk, Vyborg, Reni, Odessa, Berdyansk, Novorossiysk, Vanino, Eastern, and other centers.

Unfortunately, the following numbers of freight cars stood idle in excess of the normative periods: in Riga, 59; Ventspils, 137; Kherson, 45; Kerch, 24; Zhdanov, 104; Vladivostok, 83; and Nakhodka, 71. Under present-day conditions, this kind of carelessness is inadmissible.

The month was ended with above-norm accumulations of freight cars on the railroads at the transport centers of Ventspils, Klaypeda, Reni, Baku, and Termez.

In August the balances of imported freight at the ports dropped to 58.82 percent; including a drop to 40 percent. However, the plans for individual commodities and the joint assignments of MPS [Ministry of Railroads] and MMF [Ministry of the Maritime Fleet] remained unfulfilled. The total amounts of freight cars not provided to the ports on the plans and assignments came to 17 percent for those to be loaded with imported commodities; and 37.4 percent for freight cars on requisitions from the ports. The use of the supplied empties within the normative ties constituted 99.6 percent, which is a good indicator.

In certain transport centers, because of the regular shortage of freight cars, the situation continues to remain strained. With regard to the shipment of grain cargoes, the Leningrad and Novorossiysk transport centers operated worse than usual, and the centers on the Odessa Railroad operated completely poorly. From ports in the Black Sea Steamship Agency, there were unsatisfactory shipments of perishable cargoes, pipes and metal, cargoes of items imported from India, rubber, and bulk shipments of [edible] oils from Ilichevsk. The Belgorod-Dnestrovsk Port has regularly failed to use even the freight cars that have been provided.

An alarming situation has been created with regard to the shipment of canned goods from the Danube ports. Only 40 percent of planned number of freight cars were supplied to Vyborg for the shipment of pipes and metal; 22 percent to Leningrad; and 20 percent to Kaliningrad.

Little attention was devoted to the shipment of equipment. The task of the collectives at the transport centers is to prepare well for the acceptance of that equipment and to ship it to its destination without the slightest delays.

The river men in the RSFSR and the Ukraine participated in shipping the imported commodities. Starting in the beginning of the year, they shipped from the ports of Leningrad, Zhdanov, Kherson, Ust-Dunaysk, and certain others approximately 1.5 million tons of cargo. Unfortunately, the collectives at the transport centers have not been taking sufficient steps to include in the shipment of cargoes from the ports the large-scale motor-vehicle enterprises of the USSR Ministry of Fruit and Vegetable Management, which has expressed its readiness to participate

in the shipments of imported foodstuff cargoes and which has already confirmed this several times by specific actions.

Under conditions of the general state of overloading in railroad transport, a situation which will continue for the next two months of harvesting and procurement operations, the collectives at the transport centers must achieve a considerable improvement in the coordination of their actions.

September is the decisive month in preparing for the work of the transport centers during the autumn and winter period. The port workers and the railroad workers should attentively analyze the rich experience of joint operation, taking as their landmark the results of May 1982, when the best indicators were achieved. It is necessary to develop and to carry out steps for the reloading of mass commodities on a narrow front with the maximum benefit derived from each reloading complex and the freight-car loading and unloading fronts. It is necessary to think once again about organizing the work of coordinating councils and single dispatcher shifts, and to improve the single technological processes.

In the ports in September it is necessary to complete, for the most part, the work of repairing and the preventive maintenance on bunkers and the pneumatic reloaders, and to extend the operations in preparing for the acceptance of new specialized pneumatic reloading technology.

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BRIEFS

STORM PROTECTION--Many sectors of the railway system in the Soviet Union lie along the shores of seas and large lakes, and this necessitates additional wave protection installations. For instance, during the season of winter storms on the Black Sea in the Sochi-Gagra area the hydraulic impact reaches 20 tons per square metre of the coast. This is naturally bound to affect the railway line running by the water's edge. Scientists from the Black Sea Branch of the All-Union Scientific Research Institute of Transport Construction working to solve the problem of protecting the banks of water reservoirs by developing new protection installations have given quite a few useful recommendations. Several years ago, for example, they succeeded in reproducing a storm on Lake Baikal and were thus able to draw diagrams of protecting installations for sectors particularly exposed to danger from waves on the Baikal-Amur Railway. For this purpose, the various manifestations of the shore processes occurring on this gigantic lake were modelled in basins and channels. Builders have estimated the researchers' effort at its true worth. They appreciate the economy to be obtained by implementing their recommendations. Scientists have suggested that instead of cutting recesses for the railway bed in rocky ground on sectors with difficult terrain, the bed should be made on the bottom of the lake near the water-front. This would allow the utilisation of the rock, from which breakwaters would be made. Great interest was also aroused by research connected with the construction of the Danube-Dniester Canal. Scientists have come to the conclusion that it would be most advantageous to dig the 80-km long stretch of the canal (from the Zhebrian harbour to the Dniester lagoon) on the edge of the Black Sea coast. The earth removed would then be used to protect the canal against sea waves. Moreover, piercing the canal through the seashore would make it possible to preserve fertile soil. [Moscow SOVIET MILITARY REVIEW in English No 6, Jun 82 p 35]

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